"Technical Seminar - Theme: Professionalism and Quality Infrastructure Ensured"

AGENDA

DAY-01

Time	Topic & presenter
8:30 AM	Registration of the participant
9:00 AM	Arrival of Chief Guest
9:05AM – 9:15 AM	Offering Butter Lamp by Chief Guest Marchang Ceremony
9:15 – 9:25 AM	Welcome Speech by CDE
9:25 – 9:45 AM	Key Note address by the Chief Guest
9:45 – 10:10 AM	**TEA BREAK**
10:10 – 10:40 AM	French Drain Construction & Appropriateness. - ***Experience Sharing by Mr. Dechen Dorji, Engineer***
10:40 – 11:10 AM	Construction and Contract Management - ***By Mr. Thinley Wangchuk, AE***
11:10 – 11:40 AM	Application of Cost Indexes for Cost Estimation. Case study of (Nagor MSS) on the causes of delays of the Construction & way forward. - ***By Mr. Tshering Gyeltshen, AE-I***
11:40 – 12:10 AM	Community Contract Protocol (CCP) – Issues and challenges - ***By Mr. Karma, AE***
12:10 – 12:40 PM	GSB – current specs, work scope, unit cost – issues and challenges - ***By Mr. Tashi Chozang, AE-I***
12:40 – 1:10 PM	Urban water supply sewerage & Solid Waste – design and management. Analysis of outsourcing of solid waste management for Mongar Town. *To be continued* - ***By. Mr. Tandin Dorji, Engineer***
1:10 – 2:00 PM	**LUNCH BREAK**
2:00 – 2:30 PM	Quality Control & Quality Assurance and its significance - ***By Mr. Tenzin Tobgay, ADE***

2:30 – 3:00 PM	Current trend in Electrical Engineering – Profession & practitioner. Case study of street light: Comparative cost analysis of electrical and solar street light ***By Mr. Tshewang Tashi, AE-I (Electrical)***
3:00 – 3:30 PM	**TEA BREAK**
3:30 – 4:00 Pm	Selecting the type of Retaining/Breast wall as per site conditions- Issues and challenges Outline of CMS and related issues - ***By Mr. Pema Leki, AE-IV***
4:00 – 4:30 AM	Bio Engineering Techniques for erosion control slopes– issues and challenges - ***By Mr. Tshering Dorji, AE-IV***
4:30 – 5:00 PM	Case study on GSB works-Arbitration & dispute Resolution - ***Experience sharing by Mrs. Tshewang Peldon/AE-II***
SEMINAR ADJOURNED	

DAY-02

Time	Topic & presenter
9:00-9:30 AM	RWSS Survey and Design Parameters - ***By Mr. Lobzang Tshering, AE-III***
9:30-10: 00 AM	The context of compliance, Regulatory, Public Safety of Engineering Design Construction of and Monitoring of Public Safety in the context of Civil liability Act. - ***By Mr. Tenzin Phuntsho, DRO***
10:00 – 10:30 AM	Familiarization on PRR-2023 and Amendments - Milestone Agreement - ***by Mr. Sonam Dorji, Asst. Procurement Officer***
10:30 – 11:00 AM	**TEA BREAK**
11:00 – 12:00 AM	Works and Payment Process - ***By Mr. Tshewang Jamtsho, Asst. Finance Officer***
12:00 – 1:00 AM	Insight on **Ezotin**, **CRPS**, **e-Tool**, **CiNET & it's uses**. Tool System Access to Tende upload, set Criteria & Bid Evaluation. - ***By Mr. Amber Bdr. Pradhan, AE-IV***
1:00 – 2:00 PM	**LUNCH BREAK**
2:00 – 2:30 PM	Rural water Supply- Issues & challenges during field survey & Implementation - ***By Mr. Yeshi Chofil, Sr Technician***

2:30 – 3:00 PM	Urban water supply – Issues and challenges on Operation & Maintenance works - ***By Mr. Tshering Dorji (MMC)***
3:00 – 3:30 PM	**TEA BREAK**
3:30 – 4:00 PM	Recapitulation for 1st day Presentation ***By Mr. Lobzang Tshering, AE-III***
4:00 – 4:30PM	Recapitulation for 1st day Presentation - ***By Mr. Tenzin Tobgyel, ADE***
4:30 – 5:00PM	Recapitulation for 2nd day Presentation - ***By Mr. Dechen Dorji, Engineer***
5:00 – 5:05 PM	Vote of Thanks - ***By Mr. Karma, AE***
END OF THE SEMINAR	

Master of Ceremony (MC): Mr. Karma

Rapporteurs:

1. Mr. Tenzin Tobgyel, ADE
2. Mr. Lobzang Tshering, AE-III
3. Mr. Dechen Dorji, Engineer

French Drain Construction & Appropriateness.

DECHEN DORJI
ENGINEER

Outline

1. **Introduction**
   - ❖ Brief History
   - ❖ Definition of French Drain
   - ❖ Materials Required for Construction of French Drain
   - ❖ Working Principle
   - ❖ Appropriateness or When to Construct
2. **Construction Method**
3. Common Mistakes
4. Experience Sharing

Introduction

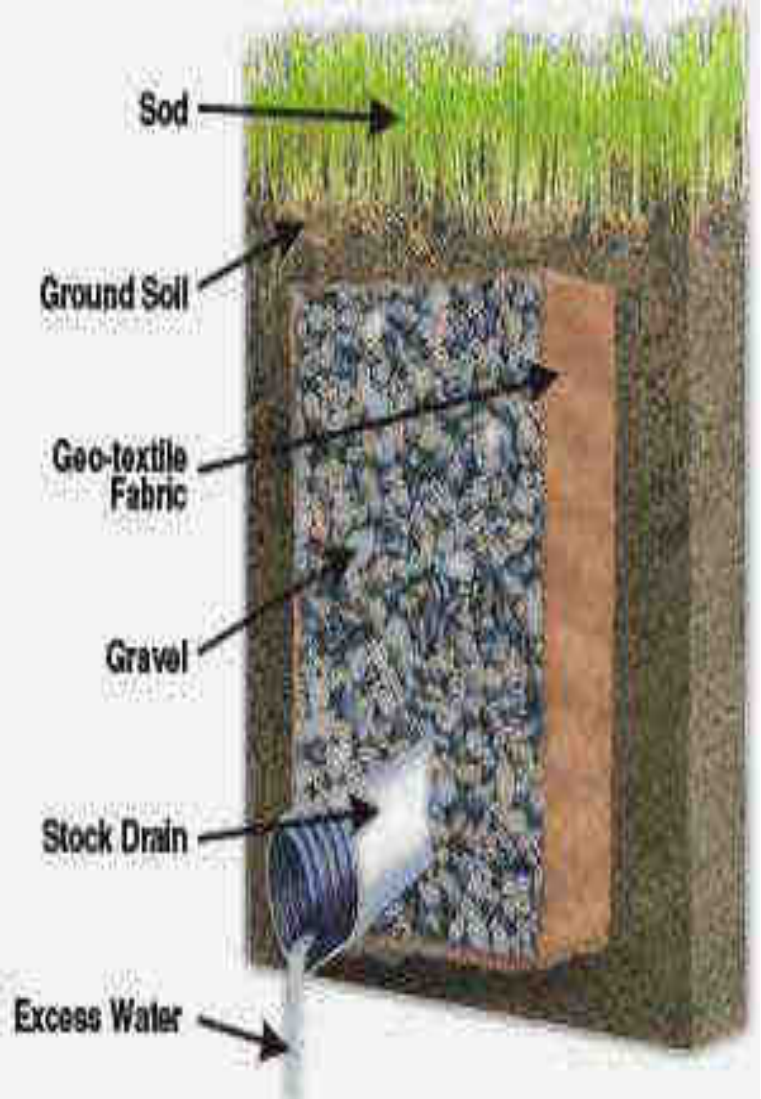
BRIEF HISTORY

- The French Drain was invented by Henry French (August 14, 1813 – November 29, 1885), a judge and Agriculturist who lived in Concord, Massachusetts, USA.
- He helped to popularize the idea specifically to drain excess water away from crop fields in order to improve the crop yield and prevent flooding.

Introduction

WHAT IS A FRENCH DRAIN?

- A French drain is a trench filled with gravel or rock, or both, with or without a perforated pipe that redirects surface water and groundwater away from an area.
- In earlier years, the drain was installed without a pipe in its base but currently some form of carrier drain pipe is usually included.



Introduction

MATERIALS REQUIRED:

1. **Round or Crushed Aggregate of 50 to 100 mm.**

Introduction

MATERIALS REQUIRED:

2. Carrier Drain Pipe.

Introduction

MATERIALS REQUIRED:

3. The Geotextile Fabric.

- Prevents migration of fine soil particles into the drain and clogging it.
- It should be water permeable : allowing water to flow freely from ground into the drain.

Introduction

WORKING PRINCIPLE

- Gravity acts on the water to draw it down into the soil through infiltration and capillary action.
- By excavating a trench, we disturb this water paths.
- By installing a French Drain, we create an ideal flow path of the water of least resistance.
- The perforated pipe installed inside the boulder/aggregate accelerates the flow of water.

Introduction

APPROPRIATENESS

1. Recurring Flooding and Foundation Damage.
2. Pooling Surface Water.
3. Retaining Walls Under Pressure.

CONSTRUCTION METHODS

1. Excavate a Trench up to Desired Depth

2. Clean out the Excavated trench.

CONSTRUCTION METHODS

3. Line the Surfaces of the excavation with a Geotextile Fabric.

CONSTRUCTION METHODS

4. Place a layer of aggregates in the bottom of the lined trench.
5. Install a carrier pipe if needed.
6. Fill the drain with aggregates.

CONSTRUCTION METHODS

7. Close the drain and wrap over the geotextile (minimum overlap is 30cm).

CONSTRUCTION METHODS

8. Cover the closed drain surface with at least 3-5cm of top soil or other low permeability material. If surface runoff is to be collected also the covering material should be permeable.

COMMON MISTAKES

1. Not Lining the Trench with Drainage Fabric.

COMMON MISTAKES

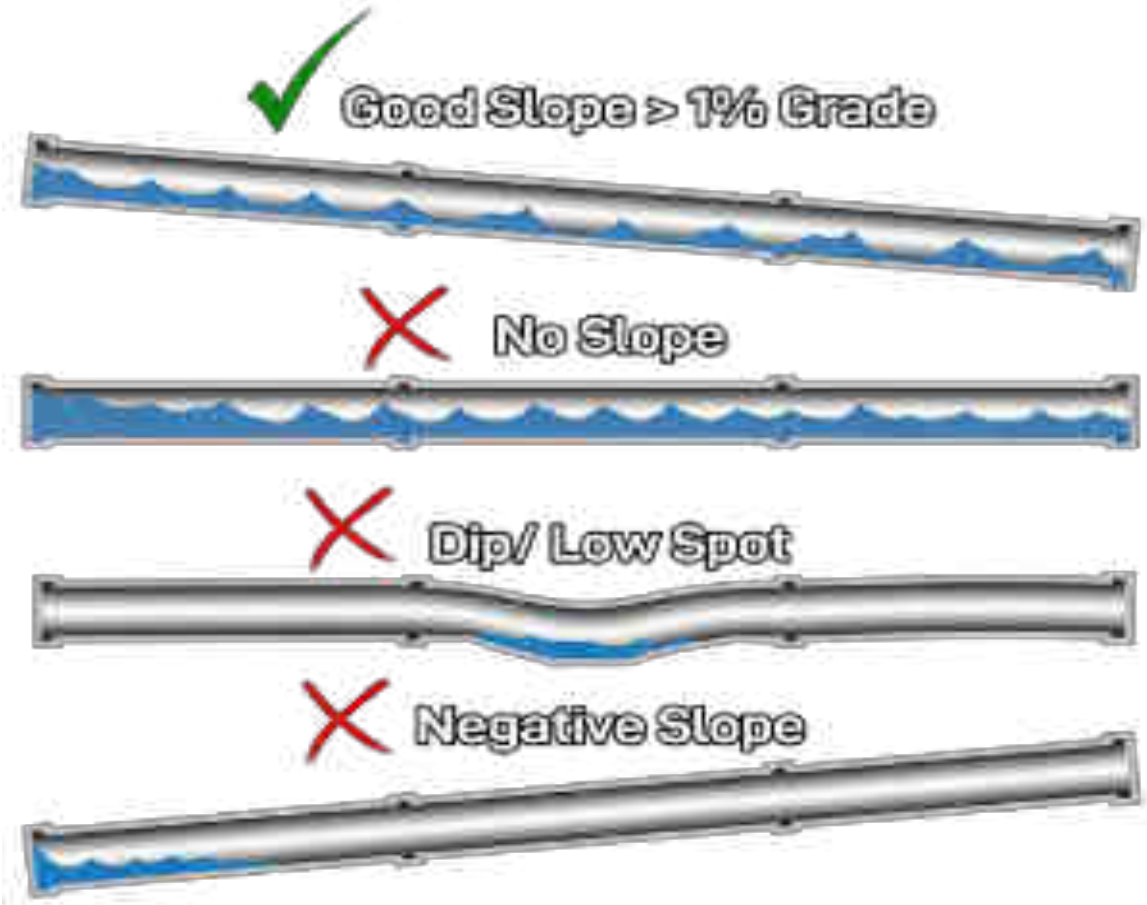
2. Selecting the Wrong type of Geotextile Fabric.

COMMON MISTAKES

3. Placing Excavated Soil Back into the Trench.

COMMON MISTAKES

4. Lack of Positive Slope for the Drain



EXPERIENCE SHARING

EXPERIENCE SHARING

EXPERIENCE SHARING

BEFORE

AFTER

EXPERIENCE SHARING

THANK YOU

CONSTRUCTION/PROJECT MANAGEMENT

"Project Management is a discipline of planning, organizing, controlling resources and tasks to achieve specific objectives within a defined timeframe and budget".

PROJECT PLANNING

- The project planning stage is a crucial phase in project management where the project's scope, objectives, tasks, timeline, resources, and risks are defined.
- During the planning stage, it involves, creating detailed project plan, identifying tasks, assigning responsibilities, cost estimation, and setting milestones.
- The project planning stage provides a roadmap that guides the team's efforts from initial start to final finish of the project.
- It lays the foundation for a successful project completion.

PROJECT ORGANIZING

- Project organizing is the systematic and structured approach taken to plan, execute, and manage a specific endeavour with well-defined goals and objectives.
- Framework that outlines tasks, responsibilities, timelines, resources, and communication channel for successful project completion effectively.
- It helps, project teams coordinate, resource allocation wisely, track progress timely, and adapt to changes, ultimately leading the project completion within the specified timeframe.

RESOURCE CONTROL

- Controlling resources in construction project involves effective management of labour, materials, equipments, and budget to ensure the project is on track as per schedule and is within the allocated fund.
- Regular progress assessment and cost tracking are essential to maintain the work flow throughout the project lifecycle.

CHALLENGES IN WORK EXECUTION

- Weather conditions
- Labour availability
- Material availability
- Design change
- Site conditions
- Equipment availability
- Communication & Coordination
- Unforeseen Calamities

WEATHER

Date : 21/8/2023

Date: 22/8/2023

WEATHER

Date: 25/8/2023

Date: 26/8/2023

Impact of bad weather

Land Slide

Rise of water table

Impact of bad weather

Land slide

Erosion

Labour availability

Recruiting Bhutanese labourers.

- Skill incompetency

  (Take more time in specific skill required work)

- Inconsistent workforce

  (Priority to social activities, annual work)

- Poor workmanship

  (No work ethics)

Remedial factors

- Skilled Team:

  Supervisor, Labourers & Contractor

- Clear Communication:

  (Client, Supervisor & Contractor)

- Risk Management:

  (Identify potential risk and develop mitigation strategies)

- Adaptation:

  (Be prepared to adapt to unexpected challenges during the construction process)

Renovation of Drametse Dratshang

Wood work(Deteriorated)

Deteriorated wooden joists

Damaged masonry wall

Splits in masonry wall

Restoration works

Demolition work

Re-construction work

Restoration works

Demolition work

Re-construction work

Mural painting on wall

Old mural paintings

New mural paintings

Achievement

Then

Now

PRESENTATION ON COST INDEXES FOR MONGAR DZONGKHAG ON BSR 2023. (Financial year 2023-24)

PRESENTER :

Tshering Gyeltshen, AE

CONTENTS.

1. Materials cost for Base Town, S/Jongkhar.
2. Analysis of material cost for project location.
3. Materials cost for Project Location, Mongar
4. Rates difference between base Town and Project location .
5. Application of cost indexes for individual

CONTENTS.

1. Materials cost at Base Town (S/Jongkhar)

Basic Rate base on BSR 2023.

Sl.No	Description of Item	Unit	Base Town S/Jongkhar	Remarks
1	Cement	MT	7533.33	
2	Steel Reinforcement	MT	63670.00	
3	Rolled Steel (Angle, Flates, Channel and Tees)	MT	69000.00	
4	CGI Sheet (0.63mm)	MT	88259.03	
5	Stone Boulders	Cum	993.64	
6	Sawn Timber	Cum	15039.16	
7	Concrete Bricks (1000) nos	Nos	10750.00	
8	Aggregrates (20mm)	Cum	990.08	
9	Sand	Cum	509.19	
10	Bitumen (80/100)	MT	54200.00	
11	Road Roller	Day	16303.68	
12	Fire wood	Cum	1200.00	
13	Blinding materials	Cum	100.00	

CONTENTS.

2. Analysis of material cost for project location.

2. Analysis of material cost for project location

Sl.No	Description of Item	Unit	Rate per Cft	Transportation charge	Rate(Mongar)
1	Stone Boulders	Cum	10.04 cft	No Trabsportation: 10.04 x 35.29=354.31	354.31
				Average Rate Nu.	**354.31**
4	Aggregrates (20mm)	Cum	33 Rs per cft	No Trabsportation: 33 x 35.29=1164.57	1164.57
				Average Rate Nu.	**1164.57**
5	Sand	Cum	395.41 per cum	No Transportation	395.41
				Average Rate Nu.	**395.41**
6	Timber (Rough Sawn)	Cum	372.08 Nu. per cft	No Trabsportation: 372.08 x 35.29=13130.70	**13130.70**
				Average Rate Nu.	**13130.70**

CONTENTS.

3. Materials cost for Project Location, Mongar

Basic Rate at Project Location, Mongar

Sl.No	Description of Item	Unit	Project Location	Remarks
1	Cement	MT	8866.67	
2	Steel Reinforcement	MT	73666.67	
3	Rolled Steel (Angle, Flates, Channel and Tees)	MT	84000.00	
4	CGI Sheet (0.63mm)	MT	152812.50	Per bundle 80kg, 12.50 bundles =1MT
5	Stone Boulders	Cum	354.31	NRDCL Zhongkhar
6	Sawn Timber	Cum	13130.70	Per cft @ 35.28 cum
7	Concrete Bricks (1000) nos	Nos	10666.67	
8	Aggregrates (20mm)	Cum	1164.57	
9	Sand	Cum	395.41	
10	Bitumen (80/100)	MT	61183.50	
11	Road Roller	Day	16624.00	As per CDCL Hiring rate.
12	Fire wood	Cum	1200.00	NRDC Rate
13	Blinding materials	Cum	100.00	

CONTENTS.

4. Rates difference between base Town and Project location .

3. Rates difference between base Town and Project location

Sl.No	Description of Item	Unit	Project Location	Base Town S/Jongkhar	Difference
1	Cement	MT	8866.67	7533.33	1333.34
2	Steel Reinforcement	MT	73666.67	63670.00	9996.67
3	Rolled Steel (Angle, Flates, Channel and Tees)	MT	84000.00	69000.00	15000
4	CGI Sheet (0.63mm)	MT	152812.50	72000.00	80812.5
5	Stone Boulders	Cum	354.31	993.64	-639.33
6	Sawn Timber	Cum	13130.70	15039.16	-1908.46
7	Concrete Bricks (1000) nos	Nos	10666.67	10750.00	-83.33
8	Aggregrates (20mm)	Cum	1164.57	990.08	174.49
9	Sand	Cum	395.41	509.19	-113.78
10	Bitumen (80/100)	MT	61183.50	54200.00	6983.5
11	Road Roller	Day	16624.00	16303.68	320.32
12	Fire wood	Cum	1200.00	1200.00	0.00
13	Blinding materials	Cum	100.00	100.00	0.00

3. Rates difference between base Town and Project location

Sl.No	Description of Item	Unit	Project Location	Base Town P/Ling	Difference
1	Cement	MT	8866.67	7800	1066.67
2	Steel Reinforcement	MT	73666.67	98000	-24333.33
3	Rolled Steel (Angle, Flates, Channel and Tees)	MT	84000.00	71250	12750
4	CGI Sheet (0.63mm)	MT	152812.50	84485	68327.5
5	Stone Boulders	Cum	354.31	993.65	-639.34
6	Sawn Timber	Cum	13130.70	13361.95	-231.25
7	Concrete Bricks (1000) nos	Nos	10666.67	11850	-1183.33
8	Aggregrates (20mm)	Cum	1164.57	990.08	174.49
9	Sand	Cum	395.41	476.91	-81.5
10	Bitumen (80/100)	MT	61183.50	54200	6983.5
11	Road Roller	Day	16624.00	16303.68	320.32
12	Fire wood	Cum	1200.00	1200.00	0.00
13	Blinding materials	Cum	100.00	100.00	0.00

CONTENTS.

5. Application of cost indexes for individual.

CALCULATION OF COST INDEX (CI) WITH BRICK INFILL WALL AND STEEL TRUSS – 2023-CIVI WORKS)

Sl No.	Description	Unit	Basic rates at base town(SJ)	Rate at Project location	% increase	Weightage	Cost index	Remarks
1	2	3	4	5	6	7	8	9
1	Cement	MT	7533.33	8866.67	17.70	15.81	2.80	
2	Steel Reinforcement	MT	63670.00	73666.67	15.70	12.90	2.03	
3	Rolled Steel	MT	69000.00	84000.00	21.74	2.42	0.53	
4	C.G.I sheet	MT	88259.03	152812.50	73.14	4.55	3.33	
5	Bricks/ICEB	Nos	10750.00	10666.67	-0.78	8.44	-0.07	
6	Stone Boulders	Cu.m	993.64	354.31	-64.34	1.30	-0.84	
7	Rough Sawn Timbers	Cu.m	15039.16	13130.70	-12.69	18.03	-2.29	
8	Stone aggregates	Cu.m	990.08	1164.57	17.62	3.89	0.69	
9	Sand	Cu.m	509.19	395.41	-22.35	1.93	-0.43	
						Cost Index=	**5.74**	**%**

CALCULATION OF COST INDEX (CI) WITH BRICK INFILL WALL AND TIMBER TRUSSES – 2023 –CIVI WORKS)

Sl No.	Description	Unit	Basic rates at base town(SJ)	Rate at Project location	% increase	Weightage	Cost index	Remarks
1	2	3	4	5	6	7	8	9
1	Cement	MT	7533.33	8866.67	17.70	15.71	2.78	
2	Steel Reinforcement	MT	63670.00	73666.67	15.70	12.82	2.01	
4	C.G.I sheet	MT	88259.03	152812.50	73.14	4.52	3.31	
5	Bricks/ICEB	Nos	10750.00	10666.67	-0.78	9.27	-0.07	
6	Stone Boulders	Cu.m	993.64	354.31	-64.34	1.29	-0.83	
7	Rough Sawn Timbers	Cu.m	15039.16	13130.70	-12.69	20.04	-2.54	
8	Stone aggregates	Cu.m	990.08	1164.57	17.62	3.86	0.68	
9	Sand	Cu.m	509.19	395.41	-22.35	1.92	-0.43	
						Cost Index=	**4.91**	%

CALCULATION OF COST INDEX (CI) WITH STONE MASONRY INFILL WALL – 2023 –CIVI WORKS)

Sl No.	Description	Unit	Basic rates at base town(SJ)	Rate at Project location	% increase	Weightage	Cost index	Remarks
1	2	3	4	5	6	7	8	9
1	Cement	MT	7533.33	8866.67	17.70	15.18	2.69	
2	Steel Reinforcement	MT	63670.00	73666.67	15.70	4.35	0.68	
4	C.G.I sheet	MT	88259.03	152812.50	73.14	6.99	5.11	
5	Bricks/ICEB	Nos	10750.00	10666.67	-0.78	4.98	-0.04	
6	Stone Boulders	Cu.m	993.64	354.31	-64.34	0.85	-0.55	
7	Rough Sawn Timbers	Cu.m	15039.16	13130.70	-12.69	22.80	-2.89	
8	Stone aggregates	Cu.m	990.08	1164.57	17.62	2.49	0.44	
9	Sand	Cu.m	509.19	395.41	-22.35	2.78	-0.62	
						Cost Index=	**4.82**	%

CALCULATION OF COST INDEX (CI) WITH BITUMEN SEALING WORKS.- 2023 -ROAD WORKS)

Sl No.	Description	Unit	Basic rates at base town(SJ)	Rate at Project location	% increase	Weightage	Cost index	Remarks
1	2	3	4	5	6	7	8	9
1	Bitumen ***	MT	54200.00	61183.50	12.88	58.76	7.57	
2	Road Roller(8-10MT)	Day	16303.68	16624.00	1.96	9.24	0.18	
3	Fire wood **	Cu.m	1200.00	1200.00	0.00	3.10	0.00	
4	Stone aggregates	Cu.m	990.08	1164.57	17.62	14.37	2.53	
						Cost Index=	**10.29**	%

CALCULATION OF COST INDEX (CI) WITH ROAD PARMENANT WORKS– RETAINING WALL, CULVERTS AND OTHER SIMILAR WORKS – 2023

Sl No.	Description	Unit	Basic rates at base town(SJ)	Rate at Project location	% increase	Weightage	Cost index	Remarks
1	2	3	4	5	6	7	8	9
1	Cement	MT	7533.33	8866.67	17.70	27.61	4.89	
2	Stone Boulders	Cu.m	993.64	354.31	-64.34	17.10	-11.00	
3	Stone aggregates	Cu.m	990.08	1164.57	17.62	2.56	0.45	
4	Sand	Cu.m	509.19	395.41	-22.35	4.78	-1.07	
						Cost Index=	**-6.73**	%

CALCULATION OF COST INDEX (CI) WITH ROAD WORKS- BASE COURSE – 2023

Sl No.	Description	Unit	Basic rates at base town(SJ)	Rate at Project location	% increase	Weightage	Cost index	Remarks
1	2	3	4	5	6	7	8	9
1	Stone Boulders	Cu.m	993.64	354.31	-64.34	4.77	-3.07	
2	Road Roller(8-10MT)	Day	16303.68	16624.00	1.96	30.52	0.60	
3	Blinding Materials	Cu.m	100.00	100.00	0.00	3.58	0.00	
3	Stone aggregates	Cu.m	990.08	1164.57	17.62	40.05	7.06	
						Cost Index=	**4.59**	%

Average cost Index.(S/Jongkhar)

- 1. COST INDEX (CI) WITH BRICK INFILL WALL AND STEEL TRUSS =1.44%
- 2. COST INDEX (CI) WITH BRICK INFILL WALL AND TIMBER TRUSSES =0.87%
- 3. COST INDEX (CI) WITH STONE MASONRY INFILL WALL =5.17%
- 4. COST INDEX (CI) WITH BITUMEN SEALING WORKS.=10.29%
- 5. COST INDEX (CI) WITH ROAD PARMENANT WORKS- RETAINING WALL, CULVERTS AND OTHER SIMILAR WORKS =(-)7.59%
- 6. COST INDEX (CI) WITH ROAD WORKS- BASE COURSE = 4.59%
- **Average cost Index = 2.46%**

Average cost Index. P/Ling

- 1. COST INDEX (CI) WITH BRICK INFILL WALL AND STEEL TRUSS =5.74%
- 2. COST INDEX (CI) WITH BRICK INFILL WALL AND TIMBER TRUSSES =4.91%
- 3. COST INDEX (CI) WITH STONE MASONRY INFILL WALL =4.82
- 4. COST INDEX (CI) WITH BITUMEN SEALING WORKS.=10.29%
- 5. COST INDEX (CI) WITH ROAD PARMENANT WORKS- RETAINING WALL, CULVERTS AND OTHER SIMILAR WORKS =(-)6.73%
- 6. COST INDEX (CI) WITH ROAD WORKS- BASE COURSE = 4.59%
- **Average cost Index = 3.93%**

Geog Cost Index. (Project Location) Rate

Sl.No	Description of Item	Unit	Rate per Cft	Transportation charge	Jurmey Rate(Mongar)
1	Stone Boulders	Cum	10.04 cft	Transportation not included. 10.04x35.29=354.311	354.311
				Average Rate Nu.	**354.311**
4	Aggregrates (20mm)	Cum	33 Rs per cft	As per Annual Quotation 2021-22, Transportation rate for T/Load is 90/-Rs per Km (90*81 till Jurmey)=7290/- consudering 1 T/load cft =7290/280= 26.04 Rs per cft. Toatal rate per Cft=33+26.04=59.04 per cft. Therfore rate per Cum =59.05x35.29=2083.52	2083.52
				Average Rate Nu.	**2083.52**
5	Sand	Cum	395.41 per cum	As per Annual Quotation 2021-22, Transportation rate for T/Load is 90/-Rs per Km (90*81 till Jurmey)=7290/- consudering 1 T/load per cum =7290/8= 911.25 Rs per cum Toatal rate per cum=395.41+911.25=1306.66	1306.66
				Average Rate Nu.	**1306.66**
6	Timber (Rough Sawn)	Cum	372.08 Nu. per cft	As per Annual Quotation 2021-22, Transportation rate for T/Load is 90/-Rs per Km (90*81 till Jurmey)=7290/- consudering 1 T/load cft =7290/280= 26.04 Rs per cft. Toatal rate per Cft=372.08+26.04=398.12 per cft. Therfore rate per Cum =398.12x35.29=14049.65	**14049.65**
				Average Rate Nu.	**14049.65**

Geog Cost Index.
(Project Location) Rate

- Cement (Base Town rate) Nu.8866.67
  Transportation charges per T/Load as per quotation(2021-22) - 90*81/8=Nu.911.25

Cement Rate transportation including=Nu. 9777.92

- Rate for Steel Reinforcement Nu. 74577.92
- Rate for Rolled Steel (Angle, Flates, Channel and Tees) . Nu.84911.25

Average cost Index.(Jurmey Geog)

- 1. COST INDEX (CI) WITH BRICK INFILL WALL AND STEEL TRUSS =12.54%
- 2. COST INDEX (CI) WITH BRICK INFILL WALL AND TIMBER TRUSSES =12.79%
- 3. COST INDEX (CI) WITH STONE MASONRY INFILL WALL =12.75%
- 4. COST INDEX (CI) WITH BITUMEN SEALING WORKS.=22.39%
- 5. COST INDEX (CI) WITH ROAD PARMENANT WORKS- RETAINING WALL, CULVERTS AND OTHER SIMILAR WORKS =15.87%
- 6. COST INDEX (CI) WITH ROAD WORKS- BASE COURSE = 44.99%
- **Average cost Index = 20.22%**

CASE STUDY :
CAUSES OF DELAYS AND WAY FORWARD FOR CONSTRUCTION WORKS AT NAGOR MSS, SILAMBI GEOG.

- **Name of work:**

  1. *Construction of 120 Bedded Hostel and Administrative Block at Nagor MSS, Silambi Geog.*

Agenda.

1. Status of work.
2. Materials at site
3. Reminder letters.
4. Reason for delays.
5. Way forward for successful completion.

1. Construction of 120 Bedded Hostel and Administrative Block at Nagor MSS.

- Total Awarded amount Nu. : 32.332 M
- Contract Start Date : 18/01/2020
- Initial contract end date: 18/07/2021
- Project duration : 18 Months
- Completion date : 25/04/2023

(Re-scheduled end date)

Delay days : 125 days till 29th August 2023.

1.Status of work……

120 Bedded Hostel . - Nu: 14.819 M

Overall financial/payment in percentage with advances

= 49.26%

Physical 65-70%

120 Bedded Hostel

1. Status of work cont……

Administrative Block. - Nu.17.520 M

Overall financial/payment in percentage with advances

= 79.10%

Physical progress =80-85% Adm Blocks.

Administrative Block Construction.

1. Status of work cont…….

120 Bedded Hostel construction.(Balance works)

- One slab works.
- Column extension/casting work.
- GRC fitting works
- Roofing works
- Drainage and plinth protection.
- Flooring works
- Plumbing and electrification works
- Finishing works.

1. Status of work cont…….

Administrative block construction.(Balance works)

- Slab casting for third floor.
- GRC fitting works
- Drainage and plinth protection.
- Flooring works
- Roofing works.
- Plumbing and electrification works
- Finishing works.

2. Materials at site

- Cement 200 Bags
- Sand : 4 T/Load.
- Reinforcement bars (sufficient for Adm Block) and 120 bedded 16mm dia required.
- 8mm for ring not sufficient (around 1 MT required)

Reinforcement Bars (Around 2MT) Balance.

3. Reminder letter served.

- 7th June 2023. work order issued for resumption and execute the mitigation works for 120 bedded hostel.(11/02/2022-07/06/2023) -15 Months 26 days.
- 19 July 2023: reminder letter served for resumption.
- Till date there contractor could not carry on with third floor slab casting works. (04/05/2023).

Reinforcement works completed.

4. Reasons for delay in works

- Financial problems
- Road condition.
- Shortages of cement/Materials
- Location of site.

5. Way for ward for successful completion

1. Follow up with reminder letters.
2. Request to submit realistic/Comprehensive work plan.
3. Call for meeting for further discussion.
4. Monitoring of work plan/key personal at work site.
5. Resource mobilization plan/Transportation of materials.
6. Department help in procuring materials.

Thank you la.

Presentation on Community Contracting Protocol 2021

མི་སྡེ་ཞབས་ཞབས་གི་ལྷ་ཞབས་ནི་བྱ་སྒོའི་ལམ་ལུགས།

Presenter: Karma Geog Engineer, Mongar

Community contracting

- The contracting work that is directly awarded to the Community Contract Group after endorsement by the Gewog Tshogde.

Objective of Community Contract

- To encourage active participation of people in development of their own community (**ownership**).
- To build capacity, Resilience and responsibility of local communities. (**Skilling & up-skilling**)
- To create employment opportunities for potential individual in the communities (**boosting economy**).
- Ensure quality to enhance long term benefits from the amenities (**Sustainability**)

Abbreviation reveals

CCP : Community Contracting Protocol
CCG : Community Contract Group
DoRF : Division of Responsibility Framework
GNH: Gross National Happiness
DT: Dzongkhag Tshogdu
GT : Gewog Tshogde
GTC: Gewog Tender Committee
PRR-2021: Procurement Rules & Regulations-2021
GA : Gewog Administration
CC: Community Contractor
TOR: Terms of Reference
COI: Conflict of Interest
CCA: Central Coordination Agency
EOI: Expression of Interest

Legitimacy of CCP

- The LG Act of Bhutan-2009

  - Devolution of power & Authority to LGs
  - Provision of democratic & Accountable for people's involvement
  - GT to approve procurement as per Financial rule & regulations.

- Procurement Rules & Regulation-2021

- Clause 4.2.6 Stipulates contracting of works up to Nu.1.50Million

Implementing Agency for CCP

- Gewog Administration (Community Contract)
- Dzongkhag Administration (Technical backstopping)

Formation and Registration of CCGs

- Notify interested community members to form CCGs & submit the list as per Annexure-A
- The timing for notification shall be decided by GA
- The list of the CCGs shall be registered by the GA and upon completion they will issue to the respective CCGs a letter of Acceptance as per Annexure-B
- The CCG should be from single Chiwog or otherwise take note of such group.
- An existing User Group may be allowed to participate in CCG
- Cooperatives registered under the cooperative Act of Bhutan -2009 shall not be eligible for formation & Registration as CCG. But an individual member can participate as the Member.
- A Local Government functionary shall not be member of CCG
- Commercial contractor cannot bid for community contract works

Implementation of Community Contract

- Notify to all CCGs registered with the Gewog about the availability of contract work specifying the detail scope of works as per Annexure-C.
- Compiling the application for the implementation of Community contract works by the interested CCGs as per Annexure-D
- The GTC shall table and review the application from CCGs for award of works
- Declare COI as per Annexure-F by the members of GTC or GTEC

Award of Community contract work

- If there is only one CCG applying for a work, It shall be awarded directly to that particular CCG.
- If there is more than one CCGs applying for the only work, the work should be awarded in order of following

1. CCG formed with residents of the same Chiwog.

2. CCG formed with residents of the same Chiwog & from some other Chiwogs.

3. CCGs formed with residents entirely from other Chiwog of Gewog.

4.If there are more than one work, CCGs shall be selected following the same order and shall be fair in the selection and award of works.

5. In case of competitive offers by different CCGs based on the criteria above, GTC shall screen CCGs based on past performance and reputation.

Disqualifying factors for the award of works

- If a CCG has work/s in hand at the time of awarding the work
- If a particular CCG has adverse records
- If the GTC sees certain risks and challenges with the potential/Capable CCG

Implementation of contract works by CCG

- The contract Agreement shall be drawn as per Annexure-E after seeking the confirmation in writing.
- The CCG have to implement the work within the given budget ceiling.
- The CCG shall be responsible to provide labor, materials & equipment.
- The CCG will execute the work as per the drawings & other requirement to ensure the quality of work.
- GA shall initiate to sign the contract agreement & issue work order

Monitoring and Assessment

- The Gup, GAO, Mangmi and the Tshokpa concerned shall be responsible for monitoring the progress of the work.
- Site Engineer and concerned sector officials shall monitor the work in line with decision of GT or GA.
- An Official or team on monitoring visit shall submit a written report to GA.
- Periodic sector coordination meeting may be conducted to discuss issues arising from monitoring & assessment.

Mode of Payment for contract works

- 30% payment immediately upon award of the work and signing the contract agreement without any BG.
- 30% payment after completing 50% of the work
- 40% upon full completion of the work after due verification and endorsement by the Gewog Administration.

Accounts of Goods & equipment

- Purchase of materials with their costs
- Hire of equipment with their costs
- Payments or labor charges made with the list of names , number of days and amount
- Materials received from Gewog if any.

Termination of Agreement

- If CC fail to fulfil its obligations under the contract
- If CC fail to comply with the agreed work programme or to complete the works within the time allowed.
- If CC embezzle or misuse the contract Amount.
- If not following the relevant TOR of the CCP.

Accounts of Goods & equipment

- Purchase of materials with their costs
- Hire of equipment with their costs
- Payments or labor charges made with the list of names , number of days and amount
- Materials received from Gewog if any.

Advantages

- No Tendering Process Involve (Time saving).
- Encourages the local communities to assume the ownership of the project output.
- Direct implementation of the works.
- Mostly Suitable in remote areas where commercial contractor is not willing to work.
- Local materials like timber, sand & boulders can be extracted from the Community Forest.
- Opportunity to learn new technical skills.
- No Mortgage or Bank Guarantee required for Advances.
- Stage payment in percentage base on work progress.
- Preservation of traditional Design and Architect during construction.

Disadvantages

- Incompetent members in the CCGs
- Unfairness in the award of Community contract work
- Risk involve for advance without Mortgage or Bank Guarantee (BG).
- Dividing the scope of works to meet the acquired thresholds (Max 1.5Million)
- Use of substandard materials
- Learning and practicing during construction affects the quality of works
- Prevails variation of Quantities with reference to drawings and Estimates
- Gewog Engineer has more responsibilities under Community contract.
- Misuse of Advances released in the name of the Coordinator

Ambiguity of CCP

- Issuance of work order
- Deduction of Retention Money (5% of the Bill Amount)
- Termination of Contract
- Recoveries of Advances
- Adverse record of particular CCG
- Assessment of risks and challenges of the potential CCGs
- Handing and Taking over of the Sites
- Encourages stage/phase payment in percentage
    1. Advance-30%
    2. 30% after completing 50% of the work
    3. 40% upon full completion of work

Capital Activities implemented in FY2022-2023

Activities	Silambi Gewog	Amount in Million	Gongdue Gewog	Amount in Million
Gewog	13	7.431	19	7.776
Central	3	71.421	3	16.823
Grand Total	**16**	**78.852**	**22**	**24.599**
Total Expenditure in Million (Silambi + Gongdue)				**103.451**

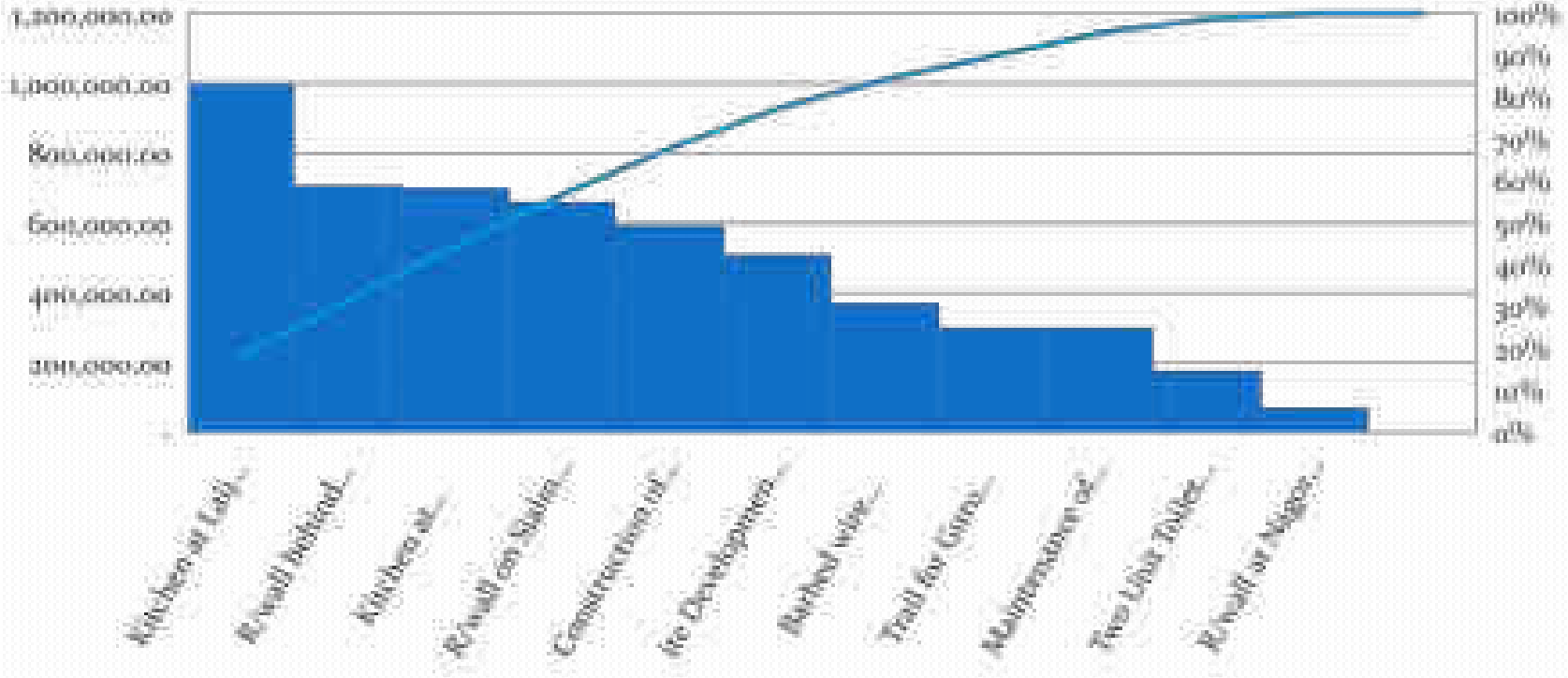
Activities Executed on Contract in FY2022-2023

Activities	Silambi Gewog	Amount in Million	Gongdue Gewog	Amount in Million
Community contract works	11	5389,747.00	18	7,683,552.15
Commercial contract works	3	71,420,458.04	3	16,823,003.00
Hiring	2	2,041,000.00	1	92,610.00
Grand Total	**16**	**78,885,1205.04**	**22**	**24,599,165.15**
	69%		**82%**	

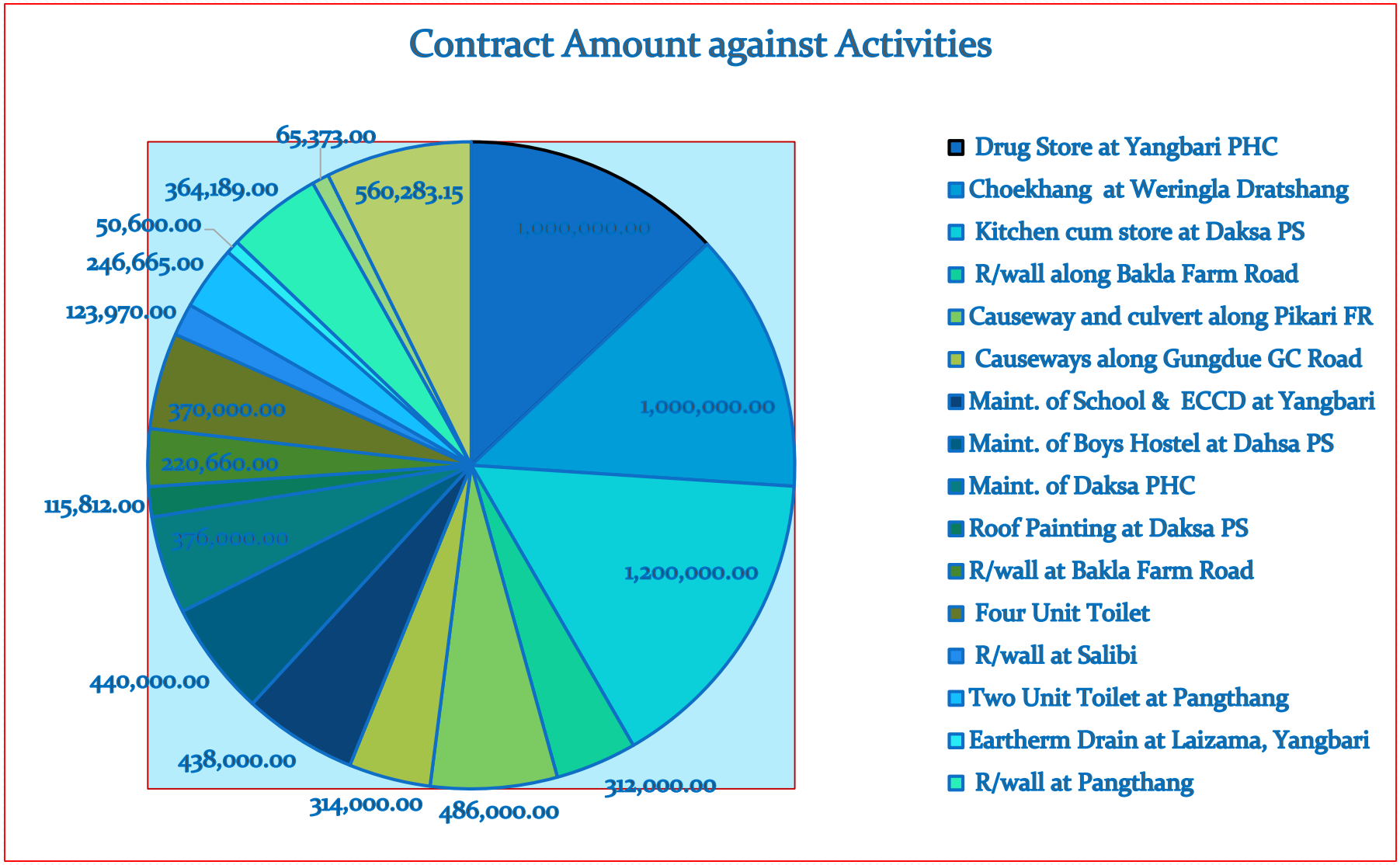
Community Contract activities in FY2022-2023

Activities	Silambi Gewog	Amount in Million	Gongdue Gewog	Amount in Million
Community contract works	11	5389,747.00	18	7,683,552.15
Commercial contract works	3	71,420,458.04	3	16,823,003.00
Hiring	2	2,041,000.00	1	92,610.00
Grand Total	**16**	**78,885,1205.04**	**22**	**24,599,165.15**

Community contracting in Silambi Gewog



Community Contracting in Gongdue Gewog



Daunting Issues

- The delay in monitoring of construction sites hampers the progress and quality of works.
- The variation of Quantities results the reduction of contract amount.
- Estimates has been prepared base on approved Budget than providing the budget depending on the Agency's Estimates.
- Acceptance of CCGs without verifying the specific skills required for the assigned works.
- Non compliance of Design & Estimates with the availability of local materials and the climatic conditions of that locality.
- Misappropriation of advances and stag payment arises conflicts amongst CCG members.
- Not completing the works within the stipulated contract period.
- Dispute settlement Role during and after construction.
- Lack of survey instruments affects the accuracy of Design & Estimates
- Work awarded to different CCGs under single work order.

Considerable Variation of Cost

- Construction of Retaining wall along Bakla Farm Road
- *Contract Amount -3,12,000*
- *Final Bill Amount: 133714.15*

Cost Difference- Nu.178286

Cost Deviation- 57.14%

The delay in monitoring of construction sites resulted confronting Issues

- Construction of Culvert on Pikari Farm Road under Gongdue Gewog

Contract Amount –Nu.486,000

Final Amount -Nu.510935

Cost Difference- Nu.24,935

Cost Deviation- 5.13%

Box culvert along Pikari Farm Road

Fallen Tree has damaged wing wall at the left bank of the stream

Estimates has been prepared base on approved Budget

- Typical example is construction of Choemey Lhakhang
- *Contract Amount : 1,262,131.00*
- *Final Bill Amount: 1,000,000.00*

Cost Difference- Nu.262, 131.00

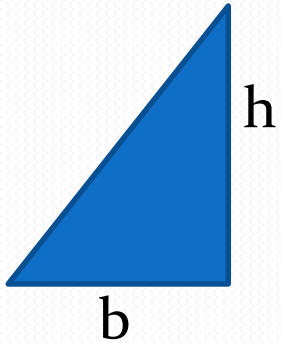
Rebate : 20.77%

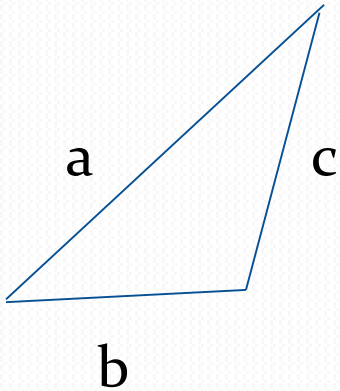
Over reinforced Design issue as well

Volume calculation for formation cutting & widening

Right Angle Triangle

- ½ Base X height x length

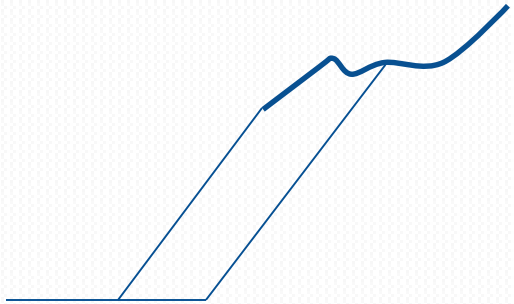




Scalene Triangle

- $\sqrt{s(s} - a)(s - b)(s - c)$

Where s = $\frac{a + b + c}{2}$




THANK YOU

Presentation on Granular Sub-base

Granular Sub Base- Current Sepecifications, Work Scope, Unit Cost- Issues and Challenges

Presented By: Tashi Chozang, AE-I

Technical specifications for Granular Sub-Base (GSB)

Scope

- This work shall consist of laying and compacting well-graded material on prepared subgrade in accordance with the requirements of Specifications.
- The material shall be laid in one or more layers as lower sub-base and upper sub-base (termed as sub base hereinafter)
- The compacted thickness of any layer at one time shall not exceed 150mm. The minimum layer thickness shall be 100mm

Technical specifications for Granular Sub-Base (GSB)

Materials

- The material to be used shall be natural sand, gravel, crushed stone, or combinations thereof depending upon the grading required.
- The material shall be free from organic and conform to one of the three grading given in table 1 and 2 below

Table -1. Grading for Close-graded Granular Sub-Base Materials

IS Seive Description	Grading I	Grading II	Grading III
75.0 mm	100	-	-
53.0 mm	80-100	100	-
26.5 mm	55-90	70-100	100
9.50 mm	35-65	50-80	65-95
4.75 mm	25-55	40-65	50-80
2.36 mm	20-40	30-50	40-65
0.425 mm	10-25	15-25	20-35
0.075 mm	3-10	3-10	3-10
CBR value (min.)	30	25	20

Table -2. Grading for Coarse-graded Granular Sub-Base Materials

IS Seive Description	Grading I	Grading II	Grading III
75.0 mm	100	-	-
53.0 mm	-	100	-
26.5 mm	55-75	50-80	100
9.50 mm	-	-	-
4.75 mm	10-30	15-30	25-45
2.36 mm	-	-	-
0.425 mm	-	-	-
0.075 mm	less than 10	less than 10	less than 10
CBR value (min.)	30	25	20

Note : The material passing 425 micron (0.425 mm) sieve for all the three gradings when tested according to IS 2720 (Part -5) shall have liquid limit and plasticity index not more than 25 per cent and 6 per cent respectively.

Technical specifications for Granular Sub-Base (GSB)

Physical Requirement

Test	Test Method	Requirement
1. Aggregate impact Value (AIV)	IS: 2386 (part 4) or IS: 5640	Max. 40%
2. Liquid Limit	IS: 2720 (part 5)	Max. 25%
3. Plasticity Index	IS: 2720 (Part 5)	Max. 6%

Work Scope

Preparation of Sub-Grade

- Excavate 150mm depth below the proposed finished level
- Clean all the forign substances
- Sub-grade shall be consolidated with 8 to 12 tones rollar


Sub grade preparation at site


Consolidation of Sub grade

Work Scope

Granular Sub-Base (GSB)

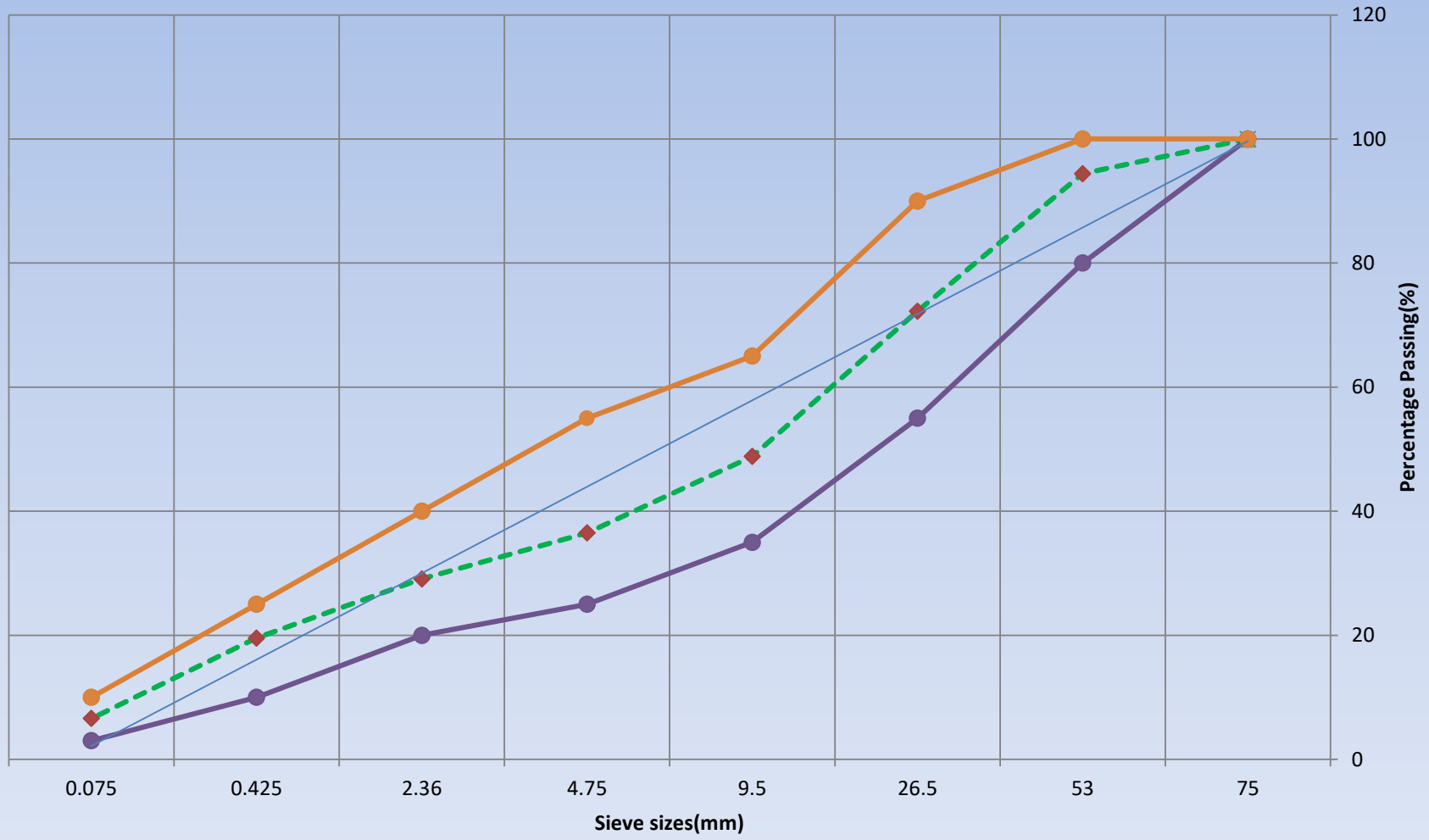
GSB material screening at site

Gradation Test at Site

Grading for Granular Sub-Base Materials

Total Sample Taken (g)	7500					
Sieve Sizes (SI) Approx. Equivalent (mm)	Weight retained (g)	Weight retained percentage (%)	Cumulative percentage retained (%)	Cumulative percentage passing (%)	Specification Limits (Grading I)	
					Lower Limit	Upper Limit
75	0	0.00	0.00	100	100	100
53	419	5.59	5.59	94	80	100
26.5	1663	22.17	27.76	72	55	90
9.5	1756	23.41	51.17	48.8	35	65
4.75	924	12.32	63.49	36.5	25	55
2.36	556	7.41	70.91	29.1	20	40
0.425	715	9.53	80.44	19.6	10	25
0.075	972	12.96	93.40	6.6	3	10
Pan	486					
Sieving loss	9					
Total	7500					

Grading for Granular Sub-Base Materials



Work Scope

Laying and compaction

- Lay the material and spread in a uniform layer across the full width required
- Oversize material shall be removed and disposed
- Moisture content of the material shall be maintain in between 95% and 100% of OMC
- following the final trime the materail shall be compacted to dry density of at least 98% of MDD(IS 2720 part 8)


Laying of GSB at site


Spreading of GSB


Rolling and compaction

Field Compection Test

Unit Cost

Unit Cost per meter as per BSR 2023

Sl.No	BSR Code	Description of items	Unit	Rate	Quantity	Amount
		Drain				
1	AR	Construction of Lined L-Shaped drain 600mm full width and 150mm thick base PCC 1:3:6, with side drain (200x300)mm plum concrete 50% boulders and 50% PCC 1:3:6 including earth excavation with or without blasting, levelling and disposal of surplus earth within 50 to 100m, centering & shuttering as per the drawings and instruction of site Engineer.	m	1195.70	1.00	**1195.70**
		Sub-Grade				
2	RW0121	Preparation of sub grade with proper camber/cross fall by excavating earth to depth equal to pavement thickness, consolidation with rollar and disposal of surplus earth up to 50m from the site	m^3	89.99	0.53	47.69
		Base Course				
3	RW0130	Providing and laying Sub-Base minimum compacted thickness 150mm with natural gravels or crushed rock less than 75mm with proper formation of cross fall using motor grader (grading as per Tech Spec) including transporting, rolling, finishing etc. complete.	m^3	1938.32	0.53	1027.31
						1075.00

Unit Cost

Unit Cost per meter as per Last year GSB works

Sl.No	BSR Code	Description of items	Unit	Rate	Quantity	Amount	Remarks
		Drain					
1	AR	Construction of Lined L-Shaped drain 600mm full width and 150mm thick base PCC 1:3:6, with side drain (200x300)mm plum concrete 50% boulders and 50% PCC 1:3:6 including earth excavation with or without blasting, levelling and disposal of surplus earth within 50 to 100m, centering & shuttering as per the drawings and instruction of site Engineer.	m	881.00	1.00	**881.00**	(Chali+Saling+Kengkhar+Silambi+Jurmey+Drepong)/6=(886+800+1000+800+900+900)6=881
		Sub-Grade					
2	RW0121	Preparation of sub grade with proper camber/cross fall by excavating earth to depth equal to pavement thickness, consolidation with rollar and disposal of surplus earth up to 50m from the site	m^3	78.83	0.53	41.78	(83+10+250+10+70+50)/6=78.83
		Base Course					
3	RW0130	Providing and laying Sub-Base minimum compacted thickness 150mm with natural gravels or crushed rock less than 75mm with proper formation of cross fall using motor grader (grading as per Tech Spec) including transporting, rolling, finishing etc. complete.	m^3	1422.67	0.53	754.02	(1626+1300+1200+1610+1400+1400)/6=1422.67
						795.80	

Issues & challenges

- Late Approval of Budget
- Short Contract duration
- Forest clearence issues
- Public objection
- No standard road width.
- Inadequate budget to take up permanent work as per site condition.
- Lack of test equipment

Thank you and Kadrinche la

Urban water supply system ,sewerage system and solid waste management

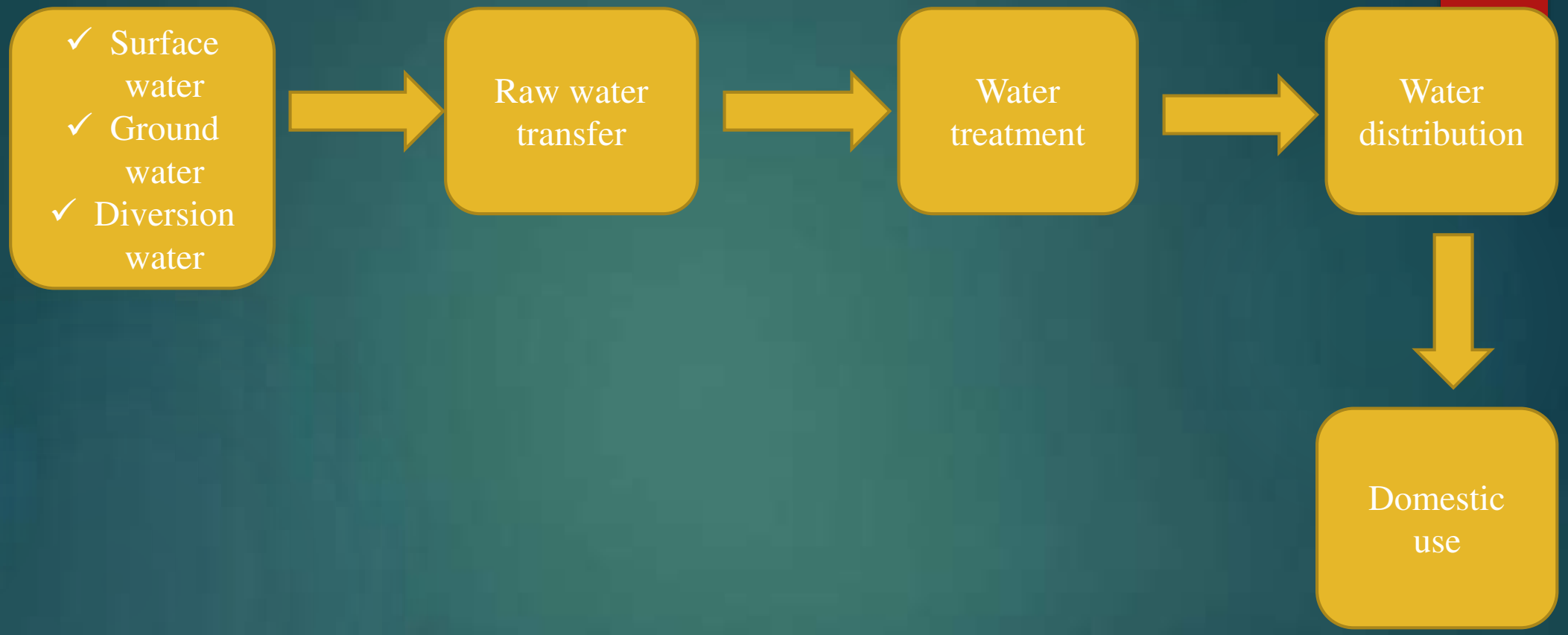
BY:TANDIN DORJI,ENGINEER

Content

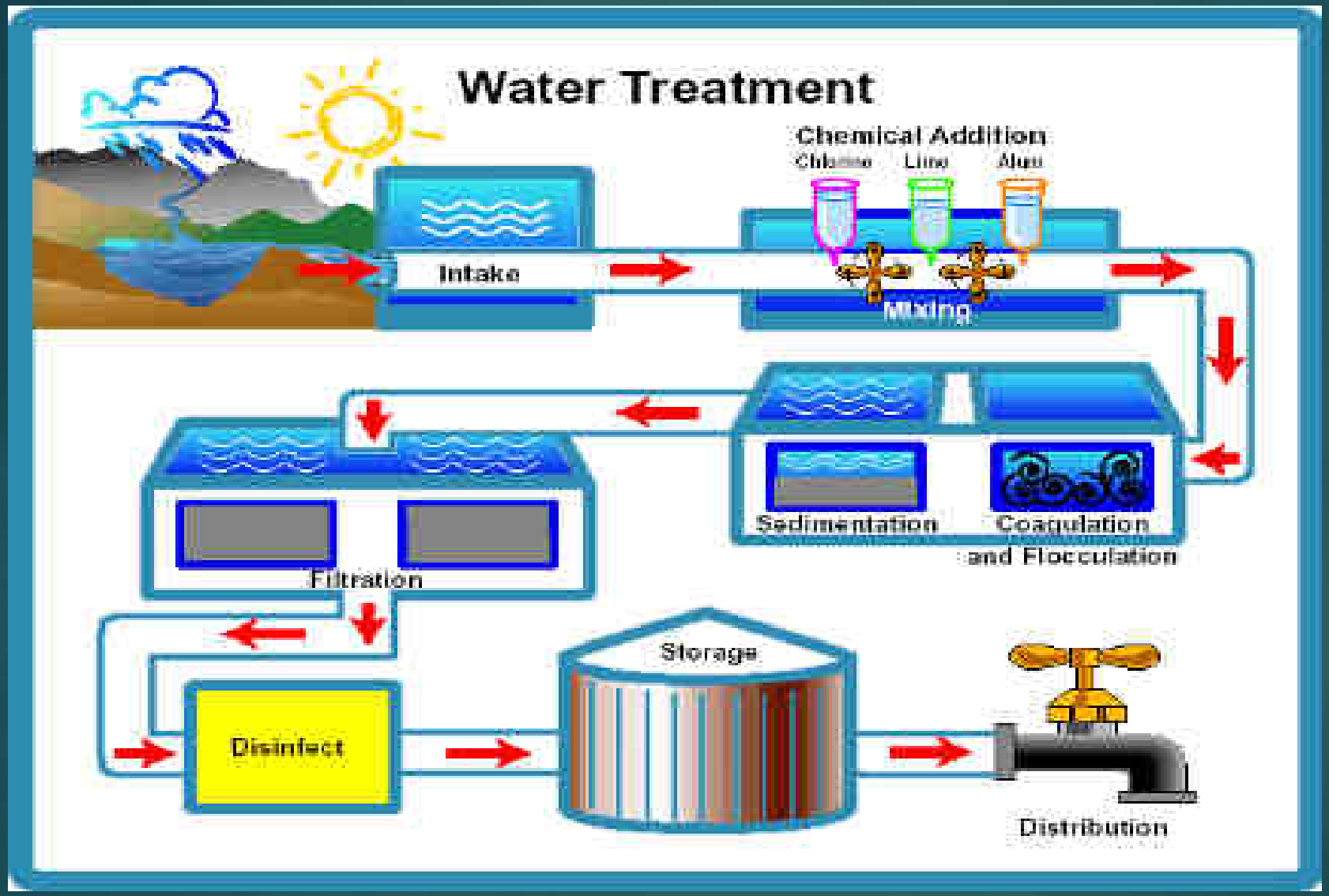
- *Urban water supply system*
- *Sewerage system*
- *Solid waste management and outscoring*

Urban Water Supply System

Water supply system cycle



Water treatment



Design of water supply scheme

- Design period(Usually between 20 to 40 years)
- Population determination
- Rate of water demand

DESIGN PERIODS FOR PROJECT COMPONENTS

	Component	*Design period (years)*
1	Storage by dams	50
2.	Infiltration works	30
3.	Pump sets	
	(*i*) All prime movers except electric motors	30
	(*ii*) Electric motors and pumps	15
4.	Water treatment units	15
5.	Pipe connections to the several treatment units and other small appurtenances	30
6.	Raw water and clear water conveying mains	30
7.	Clear water reservoirs at the head works, balancing tanks and service reservoirs (over head or ground level)	15
8.	Distribution system	30

Population determination

1. Arithmetical increase method

- Used for large cities which have reached saturation population
- Similar to simple interest method

$$P_n = P + nI \qquad \text{...(5.1)}$$

P_n = future population at the end of n decades
P = present population,
I = average increment for a decade.

2. Geometrical increase method or uniform percentage growth method

- Similar to compound interest method

$$P_n = P\left(1 + \frac{I_g}{100}\right)^n$$

3. Incremental increase method

- Combination of arithmetical and geometric method

$$P_n = P + nI + \frac{n(n+1)}{2} r$$

P = present population
I = average increase per decade
r = average *incremental increase*
n = number of decades.

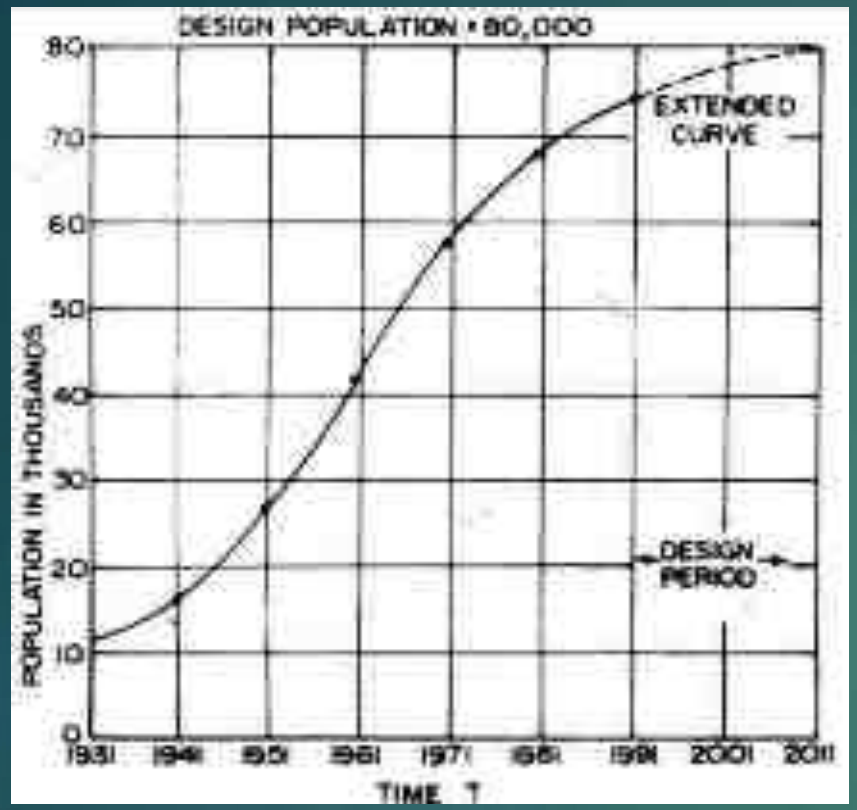
4. Decrease rate of growth method or logistics method

- The rate of increase of population is not constant but varies

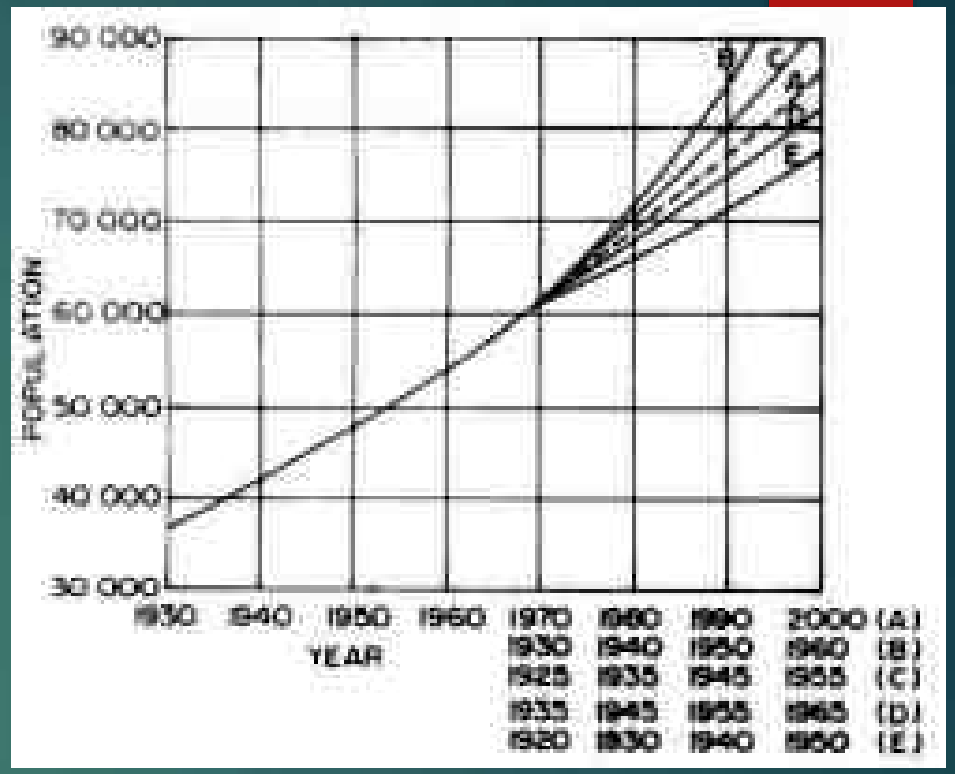
$$\log_e \left(\frac{P_s - P}{P}\right) - \log \left(\frac{P_s - P_0}{P_0}\right) = -KP_s \cdot t$$

P_s = saturation population
P_0 = population at starting point A
P = population at any time t from origin A.
K = constants

5. Graphical extension method



6.Graphical comparison method



7. Zoning method or master plan method

- As per the master plan of local area plan

8. Ratio and correlation method

- Population of small town is compared with National population

9. Growth composition analysis method

$$P_n = P + \text{Natural increase} + \text{Migration.}$$

$$\text{Natural increase} = T(I_B P - I_D P)$$

T = design (forecast) period.
P = present population.
I_B = average birth rate per year.
I_D = average death rate per year.

Water demand

1. Residential or domestic use(As per IS 1172:1957)

S.No.	Description	Amount of water in litres per head per day
1	Bathing	55
2	Washing of clothes	20
3	Flushing of W.C.	30
4	Washing the house	10
5	Washing of utensils	10
6	Cooking	5
7	Drinking	5
	Total	135 litres

S.No.	Animals	Water consumption in litres per animal per day
1	Cow and buffalo	40 to 60
2	Horse	40 to 50
3	Dog	8 to 12
4	Sheep or goat	5 to 10

2. Institutional use

	Institution	Water requirement (litres per head per day)
1.	Hospitals (including laundry)	
	(a) No. of beds exceeding 100	450 (per bed)
	(b) No. of beds not exceeding 100	340 (per bed)
2.	Hotels	180 (per bed)
3.	Hostels	135
4.	Nurse's homes and medical quarters	135
5.	boarding schools/colleges	135
6.	Restaurants	70 (per seat)
7.	Air ports and sea ports	70
8.	Junction stations and intermediate stations where mail and express stoppage (both railways and bus stations) is provided)	70
9.	Terminal stations	45
10.	Intermediate stations (excluding mail and express stops)	45 (could be reduced to 25 where bathing facilities are not provided)
11.	Day schools /colleges	45
12.	Offices	45
13.	Factories	45 (could be reduced to 30 where no bathing rooms are required to be provided)
14.	Cinema, concert halls and theatres	15

3. Public or civic use

Particulars	Liters per head per day
Road washing	5
Sanitation(Public toilets)	3 to 5
Public parks	2 to 3 per sqm per day
Fire Demand	1. *Kuichling's formula* $Q = 3182\sqrt{P}$ where Q = quantity of water in litres per minute, P = Population in thousands 2. *Buston's formula* $Q = 5663\sqrt{P}$ 3. *Freeman's formula* $Q = 1136\left(\frac{P}{5} + 10\right)$ and $F = 2.8\sqrt{P}$ where F = number of simultaneous fire streams 4. *National Board of Fire Underwriters formula* $Q = 4637\sqrt{P}\,(1 - 0.01\sqrt{P})$

4. Industrial use

Industry	*Unit of production*	*Water requirement in kilolitres per unit*
1. Automobile	Vehicle	40
2. Distillary	Kilolitre (proof alcohol)	122–170
3. Fertilizer	Tonne	80–200
4. Leather	100 kg (tonne)	4
5. Paper	Toone	200–400
6. Special quality paper	Toone	400–1000
7. Straw board	Tonne	70–100
8. Petroleum refinery	Tonne (crude)	1.5–2.0
9. Steel	Tonne	200–250
10. Sugar	Tonne (cane crushed)	1–2
11. Textile	100 kg (goods)	8–14

5. Water system losses

- Leakage and overflow from service reservoirs.
- Leakage from main and service pipelines.
- Losses with consumers premises.
- Under registration of supply meters.
- Wastage from public tapes.
- For fully metered water distribution systems,hardly 20%.
- For partially metered and un-metered system(municipal taps),50%

Sewerage system

What is sewage?

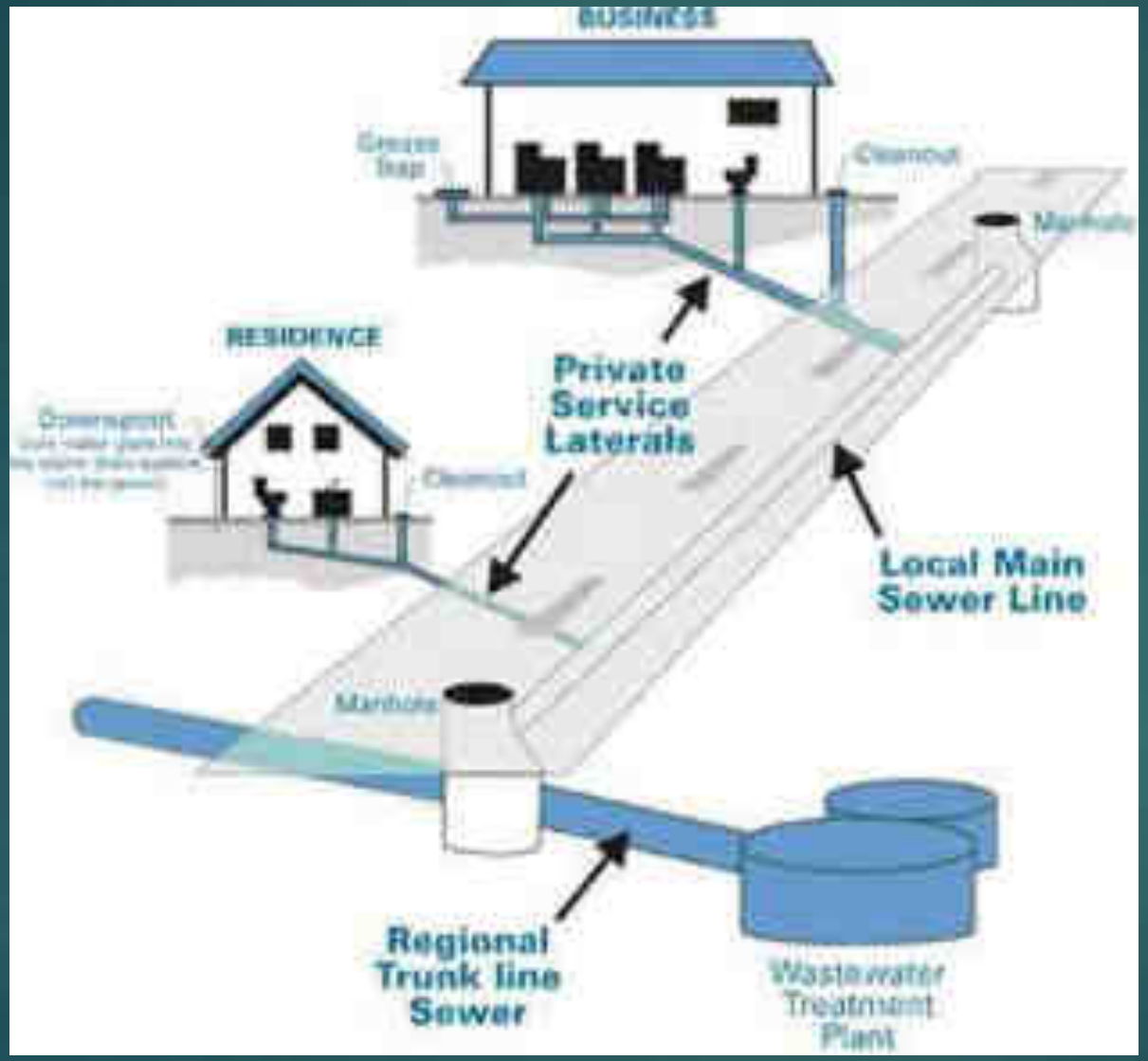
- Domestic sewage; Human excrete,Urine,waste water from kitchen& bathroom
- Industrial sewage: Industrial processes

Domestic sewage +Industrial sewage= Sewage

Types of sewerage system?

- Separate system
- Combined system
- Partially separate system

Components of Sewerage system



Design of sewerage system

- Design period
- Population determination after end of design period.
- Sewerage discharge

Table 2.1. Design Periods for Different Components of a Sewerage Scheme

S. No. (1)	Type and name of the component structure (2)	Special characteristics and reasons for the selected design period (3)	Design period in years (4)
1.	Lateral sewers, less than 15 cm in dia.	Requirements may change faster in limited area.	Full development
2.	Branches, mains and Trunk sewers	Difficult and costly to enlarge.	40—50
3.	Treatment units	Growth and interest rates being high to moderate.	15—20
4.	Pumping plant	The additional pumps can be installed in future, very easily and also within a short notice.	5—10

Population determination

- Same as water supply scheme.

Sewerage Discharge

- Qs=Per capital sewage *Expected population
- Per capital sewage=80% of per capital water demand

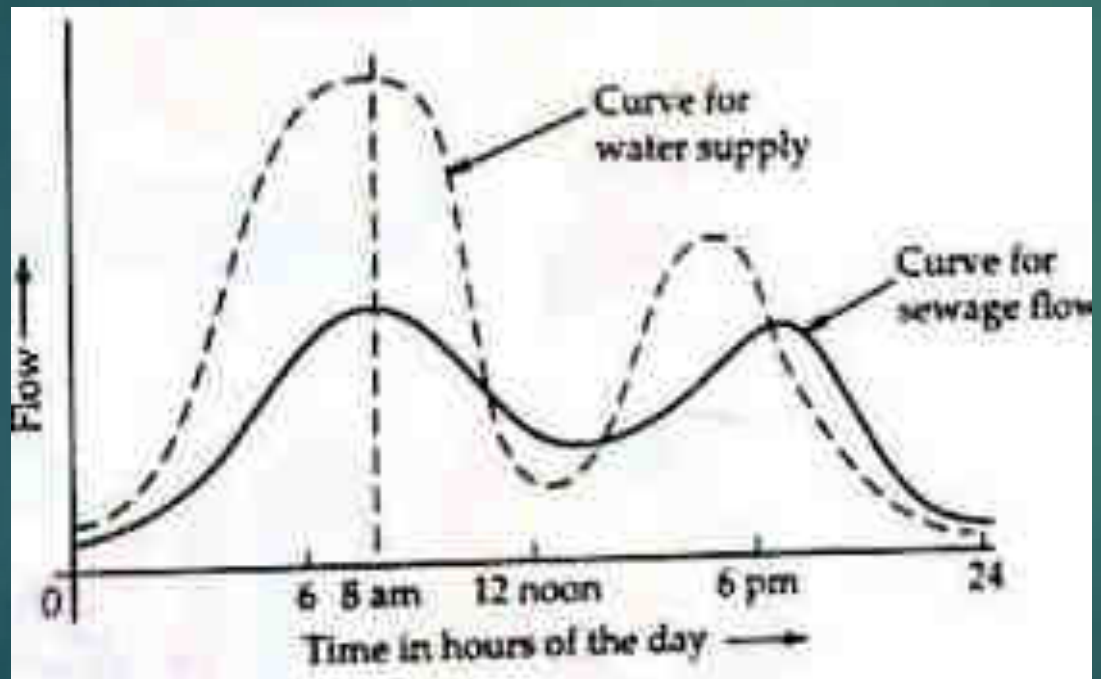


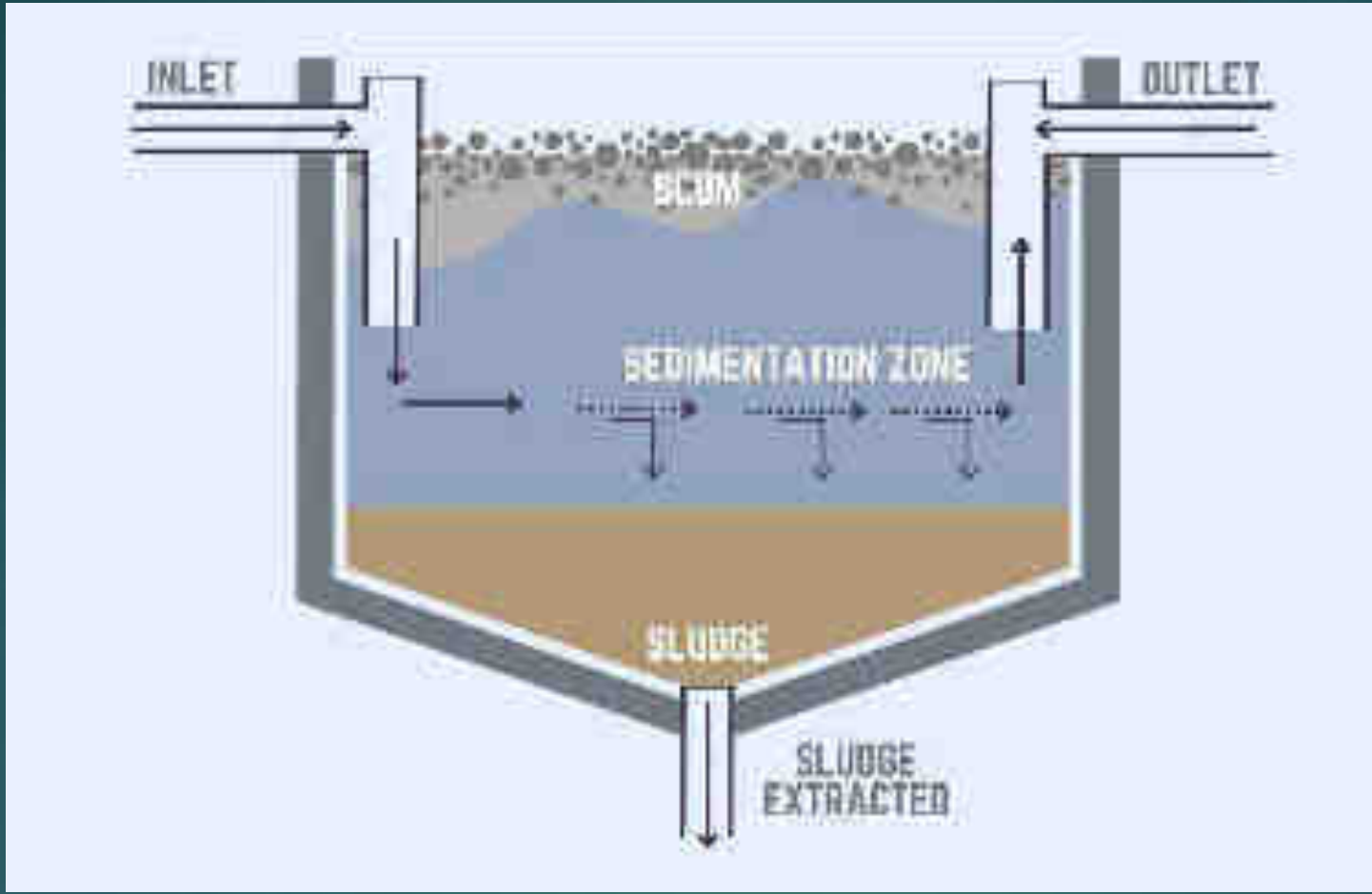
Fig. 2.1. Hourly variation of sewage flow compared to that of water supply.

Sewerage treatment

1. Preliminary treatment

- Reduces BOD by 15 to 30 %

2. Primary treatment.



3. Secondary treatment

- Decomposition by bacteria(5 to 10 % of BOD of the original)

Solid waste management

Solid waste management

- What is solid waste?-waste generated from human & animal activities.


Vedantu
Household
Institutional
Retailers and shops
MSW
Commercial
Road sweeping
Constructional


PROCESS FLOW OF
SOLID WASTE MANAGEMENT
COLLECTION
TRANSPORTATION
RECOVERY
PROCESSING
DISPOSAL

Out scoring of solid waste management in Mongar town

- Population:4452(2017)
- Waste generation for Mongar town=1080 MT per year

Advantages of outscoring?

- Cut labor cost.
- Cut vehicle maintenance cost.
- Cut operation cost.
- Waste reduction at point of Disposal(80% of the waste can be recycle)

Human resource and vehicle under Mongar Dzongkhag as of 28/8/2023

- Driver-2
- Refuse collector helper-2
- Refuse collector vehicle-2

Expenses for operation and maintenance for Mongar Town

- Fuel- Monthly on an average Nu 48,000 for both vehicles
- Maintenance cost: Roughly on a average Nu 10,000 every after 2 months.
- Salaries:Nu 84,000 per month

Total yearly expenditure: Roughly Nu 1,704,000 per year.

References

- *Environmental engineering (Volume 1) by Dr. B.C Punmia*
- *Sewerage disposal and air pollution engineering by Santosh Kumar Garg*

Thank you

Presentation
on
Case study of street light: Comparative cost analysis of LED Street light and solar street light
&
Cost Index for Electrical 2023-2024

By:- Tshewang Tashi, AE Electrical

Existing Finding

Street line alone the lower tailing and Jarakhasor (near chorten) are all without UG cable and external line connection as shown above photo.

Way Forward

To stream line the continuity of street light, we will replace with solar street light on existing pole. Requirement on next slide


BIC pole 4
Existing pole 7
Existing pole 10
Existing pole 11
Existing pole 14

Replacement of solar street light and Maintenance part

Existing Finding

For Changshingpag existing 10 Solar set has been installed and Extra 10 poles with solar need to install

Way Forward

To errect the 10 poles we required labour to dig the hole, welder and necessary materials.

Replacement of LED street light and Maintenance part

Existing Finding

Due to pole arm, the electricain are not able to replace the fuse LED bulb in time and risky of falling down

Way Forward

If Dzongkhag could help us to purchase the sky bucket crane, so that we will maintain the street lighting functional all the time.

fluctuations in voltage led to flicker of LED street as a result of voltage variations in the electrical circuit. Numerous things, including variable power supplies,

Surge protection offers a solution to prevent these fluctuations or shifts to damage their lights but the cost of surge protection is Nu.3500.00 at India and also we need to maintain time and again

Comparison LED Street light and Solar street light

LED Street Light

- street lights require wiring and underground trenching to connect to grid lines creating enormous additional costs
- Required timer and sensor
- Nu. 26.88 meter bill for `100 watts bulb in month

Solar Street Light

- solar powered LED street lights are much easier to install
- It has stable and reliable battery which can last over 4-5 years
- Auto switching controller
- No rental bill

``

Comparison LED Street light and Solar street light

LED Street Light

- Maintenance cost is one of the ongoing problem that facility and Electrician face when dealing with street lights
- Cost per pole with street light =Nu. **29512.28**

Calculation

Solar Street Light

- Solar powered LED street light just need to clean the solar panel once a month to ensures a maximum output
- Cost per pole with Solar street light =Nu. **17311.94**

Electrical Pre Contract Aggrement and **Check list**

Pre Contract Aggrement sample form

Check list of Material at site sample form

Requirement of Electrical safety equipment and tool

- Safty belt
- Halmet for electrical safety
- Electrical HT safety Glove
- Codeless hand drilling machine
- DC/AC Digital Clamp meter

Approved Electrical Product (Wire)

1	Wires & cables	Domestic wires and cables	Hilites	Hilites's India Pvt. Ltd.	Anchor Wire
		Domestic wires and cables	ATC	ATC Cables Private Limited	
		Domestic wires and cables	HLT	Hilites's India Pvt. Ltd.	
		Domestic wires	Gee Cab	Gananayak Cable Industrie	
		Domestic wires and cables	Gee N	Gananayak Cable Industrie	
		Domestic wires and cables	Royal Cables	Yarab Private Limited	
		Domestic wires and cables	System	kuber Enterprise,Kusum cable & wires pvt. ltd.	
		Domestic wires and cables	Kei	Kei Industries Limited	
		Domestic wires and cables	Polycab	Polycab India Limited	
		Domestic wires and cables	Richa	Richa Cables Pvt. Limited	
		Domestic wires	MICROTEK	Microtek Balaji Powertonics Private Limited	
		Domestic wires and cables	Anchor	Panasonic Life Solutions India Pvt. Ltd.	
		Domestic wires and cables	Goldmedal	Goldmedal Electricals Pvt. Ltd.	
		Domestic wires and cables	Flexmate	Jain Associates	

Approved Electrical Product

2	Switch Socket Wiring Accessories	Switches & sockets	Goldmedal	Goldmedal Electricals Pvt. Ltd.	Anchor Roma
3	LT power cables	LT XLPE cables	Flexmate	Jain Associates	
		LT XLPE cables	Flexmate	Jain Associates	
		LT power cables	Richa	Richa Cables Pvt. Limited	
4	Service cales	OverHead Power Cables	Flexmate	Jain Associates	
5	Meters	Water meters (Domestic Type)	Everest	Everest Sanitation India	
6	LEDs	LED Lamps and Luminaries	Victor Led	Future Led	
			Orient	Orient Electric Limited	
			Philvel	Fabricast Equipment	
			Ki Kalingia	Kalingia illumination Pvt. Ltd.	
			Goldwyn Led	Goldwyn Limited	
			Nortek	Dynamic Lighting Solutions LLP	

Approved Electrical Product

7	Elevator	Elevator	GRJ	GRJ Elevator Private Limited	
			Johnson	Johnson Lifts Private Limited	
8	Escalator	Escalator	Johnson	Johnson Lifts Private Limited	
10	Conduits	PVC Rigid Plain conduit and Cables Trunking and Ducting System	Richa	Richa Cables Pvt. Limited	
			Gee Cab Plast	Gananayak Cable Industrie	
11	Firm Alarm System	Addressable	NOHMI	Nohmi Bosai Limited	
12	Meters	Water Meter	Everest	Everest Sanitation India	
13	Protective Devices	MCB	Microtek	Microtek International Private Limited	Havells brand
14	Geysers	Stationary storage type electric water heaters	System	kuber Enterprise,Soneja Electricals	

Cost Index for electrical 2023-2024 base town S/Jongkhar

Rates at Project Location(Mongar)

Rates at Base Town As per BSR 2023

COST INDEX (ELECTRIFICATION WORKS)

Sample Cost Index for electrical 2023-2024 base town P/ling

Rates at Project Location(Mongar)

Rates at Base Town Phuntsholing As per BSR 2023

COST INDEX (ELECTRIFICATION WORKS) base town P/Ling

Job Distribution of Electrical and Electrician

Re-shuffling of Electrical Engineers 2023-2024

Re-shuffling of Electrician and their Job Responsible 2023-2024

THANK YOU

1st TECHNICAL SEMINAR, MONGAR DZONGKHAG

"Selection of Wall,Retaining & Breast Wall"

Presenter: Pema Leki,AE

OUTLINE

Introduction

- Types of Retaining wall(R/wall) & Breast wall, B/wall with purposes
- Selection of site as per the site condition.
- Materials used
- Common wall constructed
- Issues and challenges

Introduction

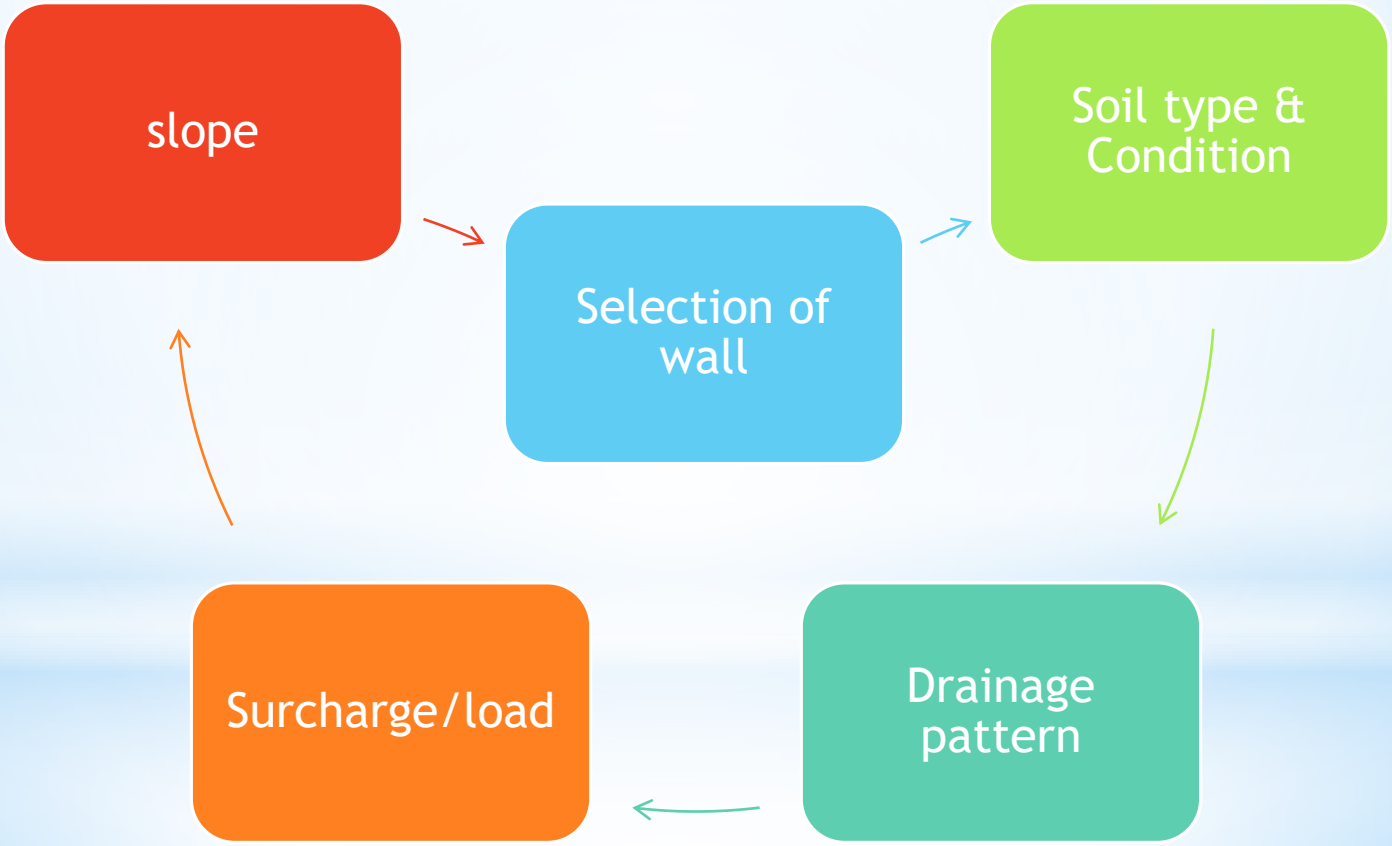
Retaining Wall: The structure is constructed to resist the lateral pressure of soil when there is a desired change in ground elevation that exceeds the angle of repose of the soil.

Breast Wall: the wall built to prevent the soil on a natural slope embankment from sliding down the slope from the harsh weather effects, i.e. land sliding, erosion

TYPES OF R/WALL

- Gravity wall(Gabion Retaining Wall, Crib Retaining wall)
- Reinforced Retaining Wall.
- Concrete Cantilever retaining wall.
- Counter-fort / Buttressed retaining wall.
- Soil nailed wall.

SELECTION OF WALL



Gravity wall

-Gravity retaining walls-low height

-base width - 0.3 & 0.5 H, where H is the height of the wall and the top width is between 0.2m to 0.3m.

-Gravity retaining wall: It is not used for heights of more than 3.0 m.

-Gabion & Crib retaining are type of Gravity wall

-Reinforced concrete and reinforced masonry walls on spread foundations are gravity structures in which the stability against overturning is provided by the weight of the wall and reinforcement bars in the wall

RCC Wall

-Base width = 1/2 to 1/3 x height of the wall.

Base thickness = 1/8 xheight of the wall
Stem thickness = 6 inches + ¼ inch for each foot of wall height.

Retaining wall height exceeds allowable measure for gravity **retaining walls**, **reinforcement** can be used to provide stable **retaining wall** conditions.

3. Cantilever Retaining wall

-A cantilever retaining wall is L-shaped, or inverted T-shaped, foundation

-It is the most common type of retaining wall and its is economical up to height of 10m.

Counterfort retaining walls are economical for height over about 6 m.

-Cantilever retaining wall is mainly designed for Active Earth Pressure.

Cantilevered wall

Gabion Retaining wall

Counter-fort / Buttressed retaining wall.

-similar to that of cantilever wall

-wall height form 3 to 8m

-base width is kept from 0.5H to 0.7 H, in which H is the total height of the retaining wall.

Materials used for R/wall & B/wall

Stone

Concrete blocks

Wood

Issues & Challenges

- Budget
- Slope of the wall
- Cement mix ration
- Designed width
- Curing on time
- Specifications

Common wall Constructed in Bhutan

1. Gravity wall, Max. Ht-9m RRM, CRM..(Gabion , Crib wall)
2. Reinforced wall
3. Plum Concrete wall(Common used by Dantak)

NOTE: Till now I have only used Gravity wall and Gabion wall for construction of Retaining & Breast wall.

As per the Design Division, the RRM can be constructed at the Max. height of 9m with length 9.6m.

Wall Constructed in Bhutan

Random Rubble Masonry

Gabion Wall

Plum Concrete Wall

Current Practice

-we have implement to construct the plum wall from the previous FY.

-Plum concrete wall may be defined as the normal concrete mix with large size of stones up to 300mm as inner fillers.

- The quality of the wall can be achieved but due to the workmanship the walls constructed are not as per the design and the dimensions also defers from the designed and drawings.

Way forward

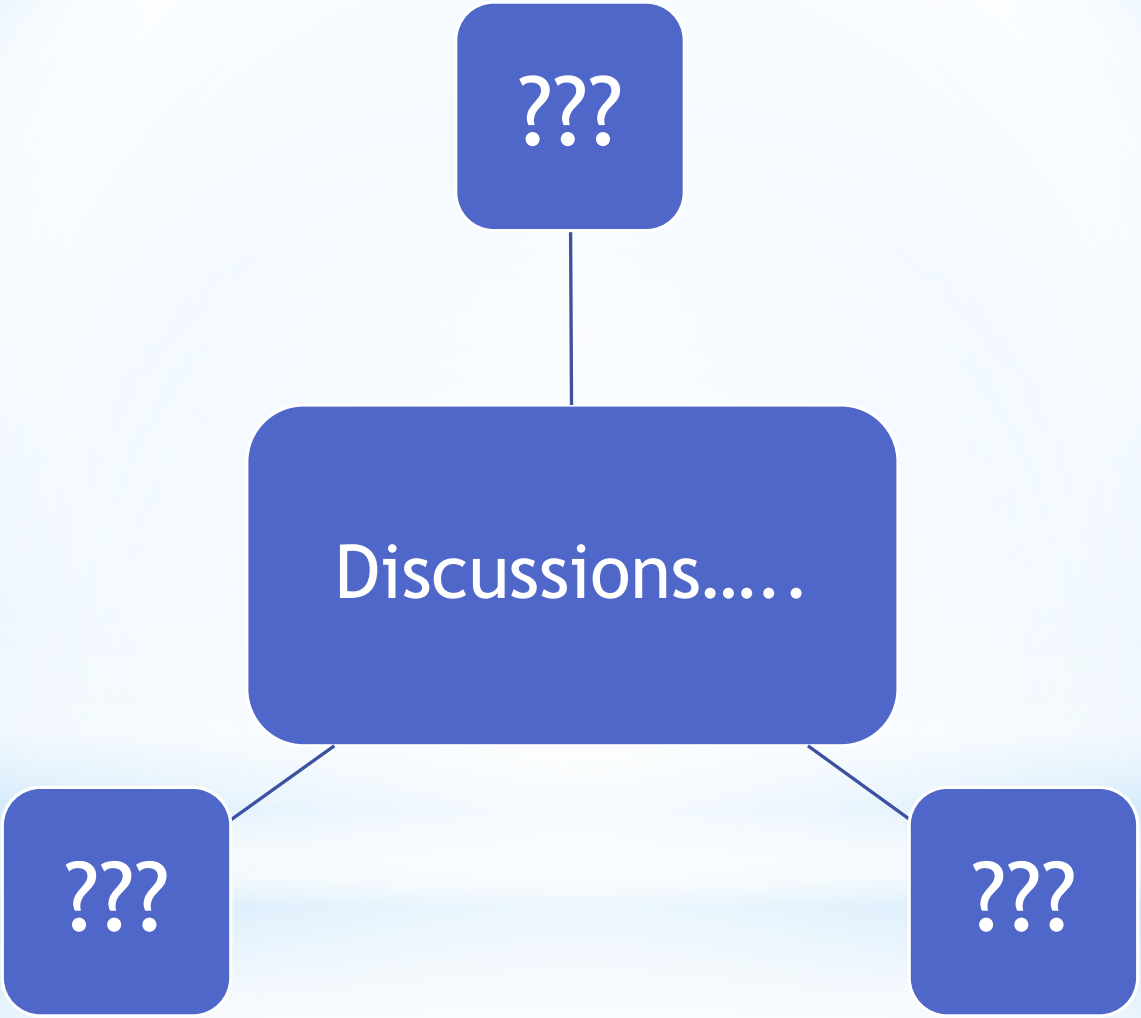
1. Budget proposal as per the design
2. Selecting the appropriate wall as per the site location.

Construction Manager Software

ISSUES & CHALLENGES

- Chronological order
- Time consuming(Initial state)
- Most appropriate for Big project
- The qty. for same item code for different structure gets club together.

THANK YOU ALL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Discussions…..
???
???

Bioengineering techniques for soil erosion protection and slope stabilization

Outline

- Introduction.
- Materials and methods:

1. Bush-mattress construction with wood pegs.
2. Wattle fences (wicker).
3. Log brush barrier.
4. Fascines (bush wattles).
5. Wood fences.

- Conclusion.

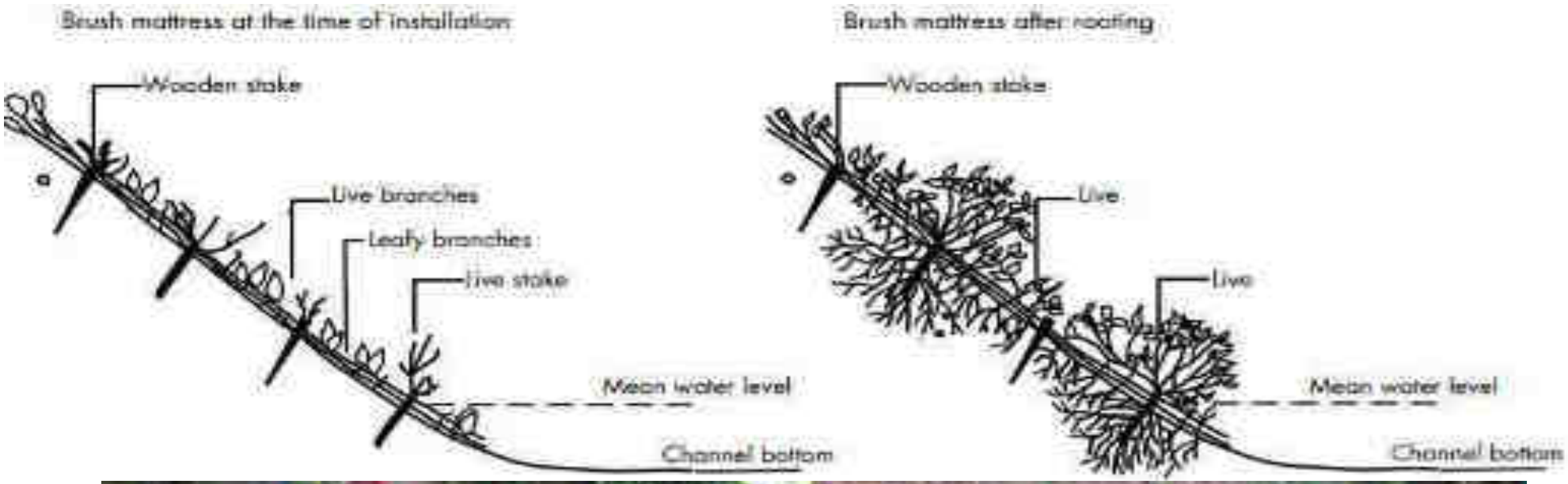
Introduction

Soil bioengineering is an applied science that combines the use of engineering design principles with biological and ecological concepts to construct and assure the survival of living plant communities that will naturally control erosion and flooding.

Horticultural principles are applied to establish the plant communities. Engineering design principles are applied to build structures that will help protect the communities as they grow to maturity and function as they would in their natural settings.

Materials and methods
1. Bush-mattress construction with wood pegs

- They are built rectangular to the slope and in contour lines direction consistent of 15-20 or and 25- 30 living branches of Salix, Elaeagnus, Platanus etc.. each with length 60 cm and diameter 6-40 mm.
- The sprout buds of branches are bedded in the same direction and they tied up in fascines with 15-30 cm length in length fascines direction with touching between them.
- The fascines stabilized on slope surface with wood pegs each with length 1.0 meter and diameter 4-7 cm. The wood pegs are driven into the soil through the mattress in ditches (depth:60-70 cm).
- The above construction can duplicated set of fascines every 2-3 meters in slope direction according the conditions of slope stabilization. The upside of slope and behind of the fascine can filled with soil or planted (plants cuttings) or seeded.


Brush mattress at the time of installation
Wooden stake
Live branches
Leafy branches
Live stake
Mean water level
Channel bottom
Brush mattress after rooting
Wooden stake
Live
Live
Mean water level
Channel bottom

Advantages:

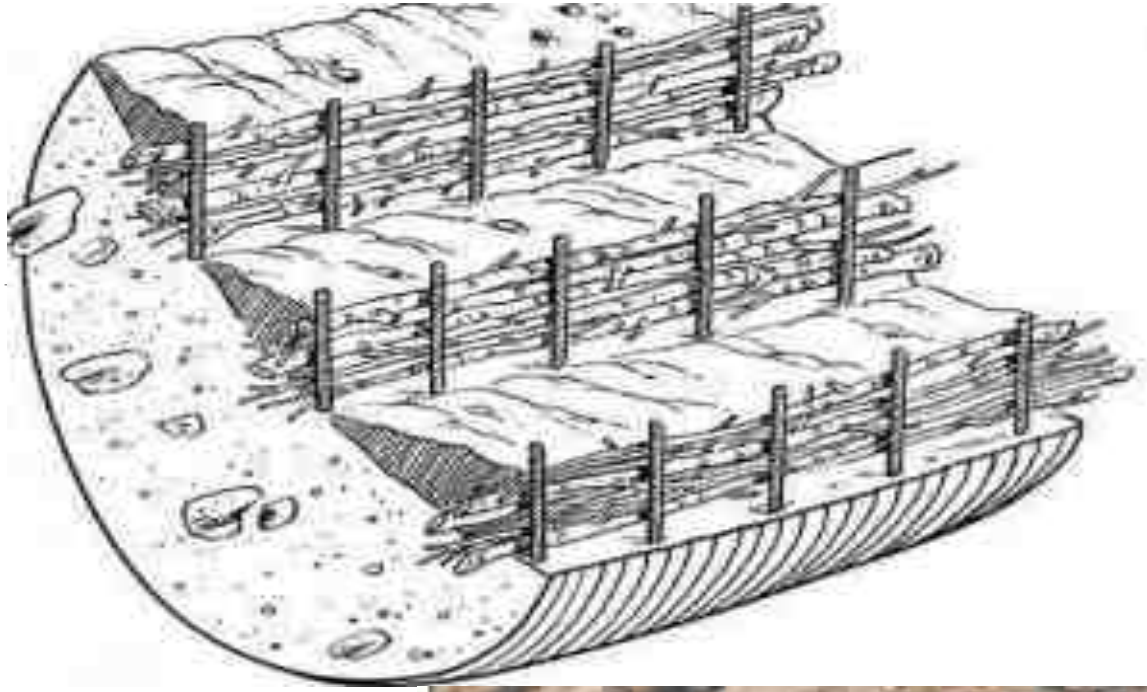
- Immediately effective after installation
- Dense root system and thicket developed
- Flexibility in preparation and protection
- Material easily available as structures also serve as a nursery for new plant material

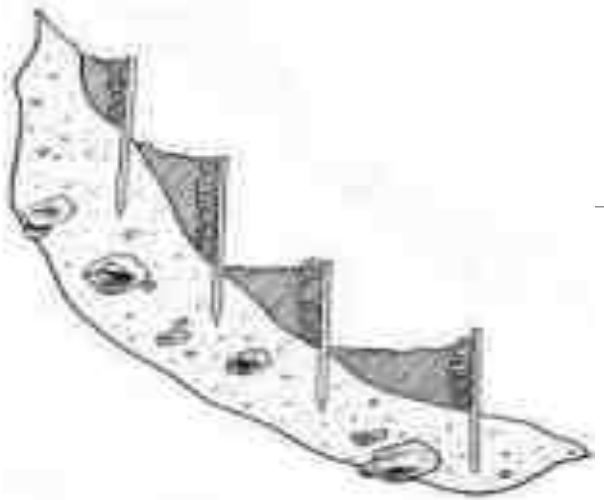
Disadvantages:

- High demand on material and labour
- Occasionally thinning of thicket necessary
- Labour intensive

2 Wattle fences (wicker)

- Chestnut pegs (length:1m, diameter 4-5 cm) driven into the soil (depth 50-70 cm) according the contour lines every 1 meter
- Between these pegs (every 20 cm) shorter of living material (diameter 2-3 cm, length 60 cm) are driven in (depth 30cm) and strong rods of sprouting material (such as rods of Salix, Platanus) are woven around them.
- The ends of the woven rods are struck into the soil (depth 10 cm every 10 cm between them).
- The construction is placed in part of the internal surface of slope (distance 30 -50 cm). The part between slope and construction filled with excavations products or surface soil of slope. In that way stabilize and suitable flat surfaces created for planting.





Advantages:

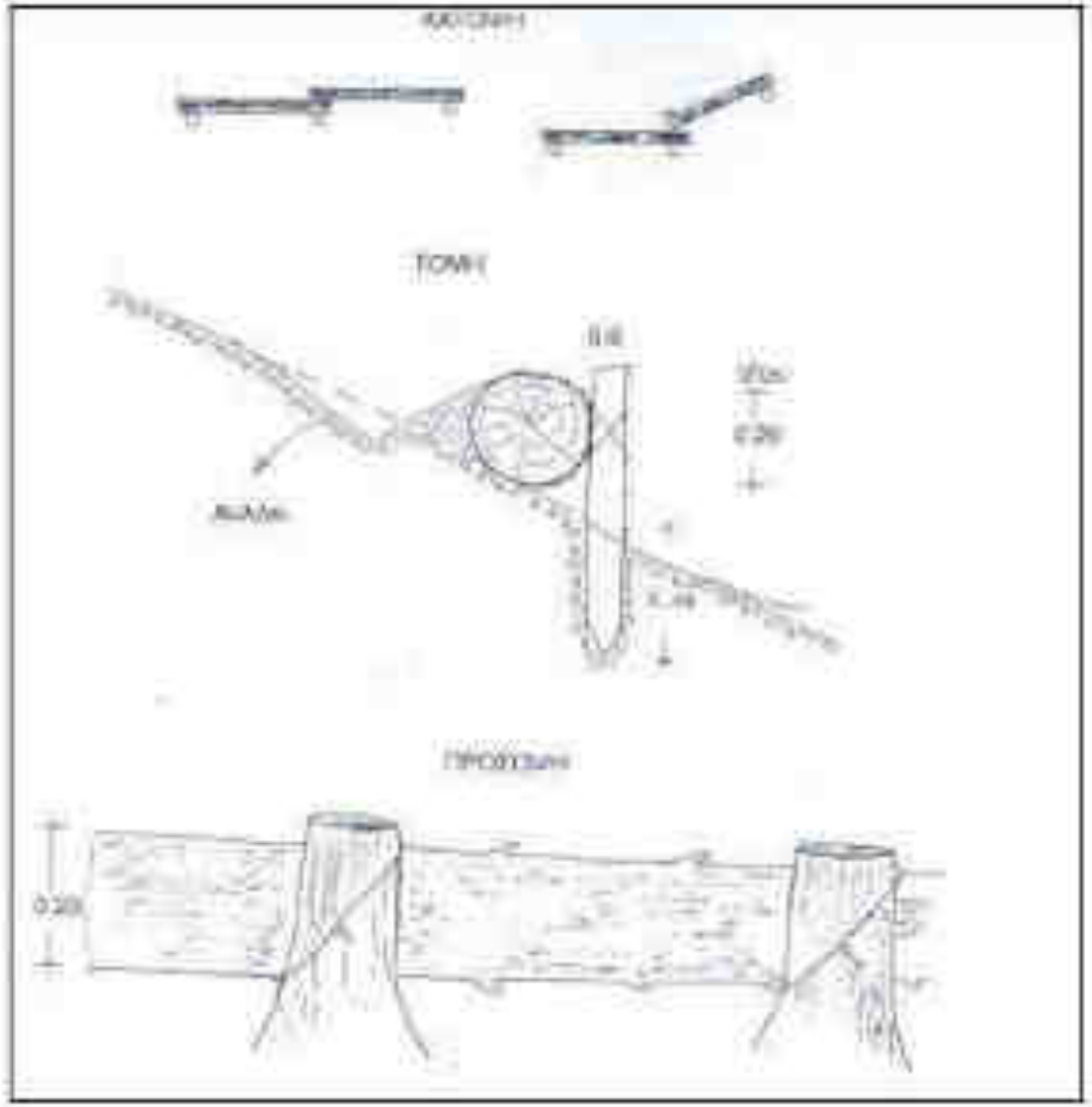
- Rooted fences retain and stop moving soil, and establish terraces
- A flexible and rapid step towards a climax-like vegetation
- Easily combined with other methods

Disadvantages:

- High labour and material costs and continuous control required
- Securing effect is small
- Large quantities of flexible branches are required (potential lack of local material)
- Easily damaged thus not sufficient for persistent rockfall

3.Log brush barrier

- The log brush barriers are wood parts of trees (diameter 20-25 cm length 6 m) (such as Cypressus, Pinus nigra, Quercus, etc.)
- The right areas were the barriers will be placed are chosen and lined on the surface soil with right logs and right length.
- The logs are placed in contour lines and fastened exactly to the soil with pegs with diameter 8-15 cm which are struck into the soil in 30 cm depth.
- The upside is formatted as groove form and is covered with brunches or rocks or soil from excavations of grooves until the log top.



Advantages:

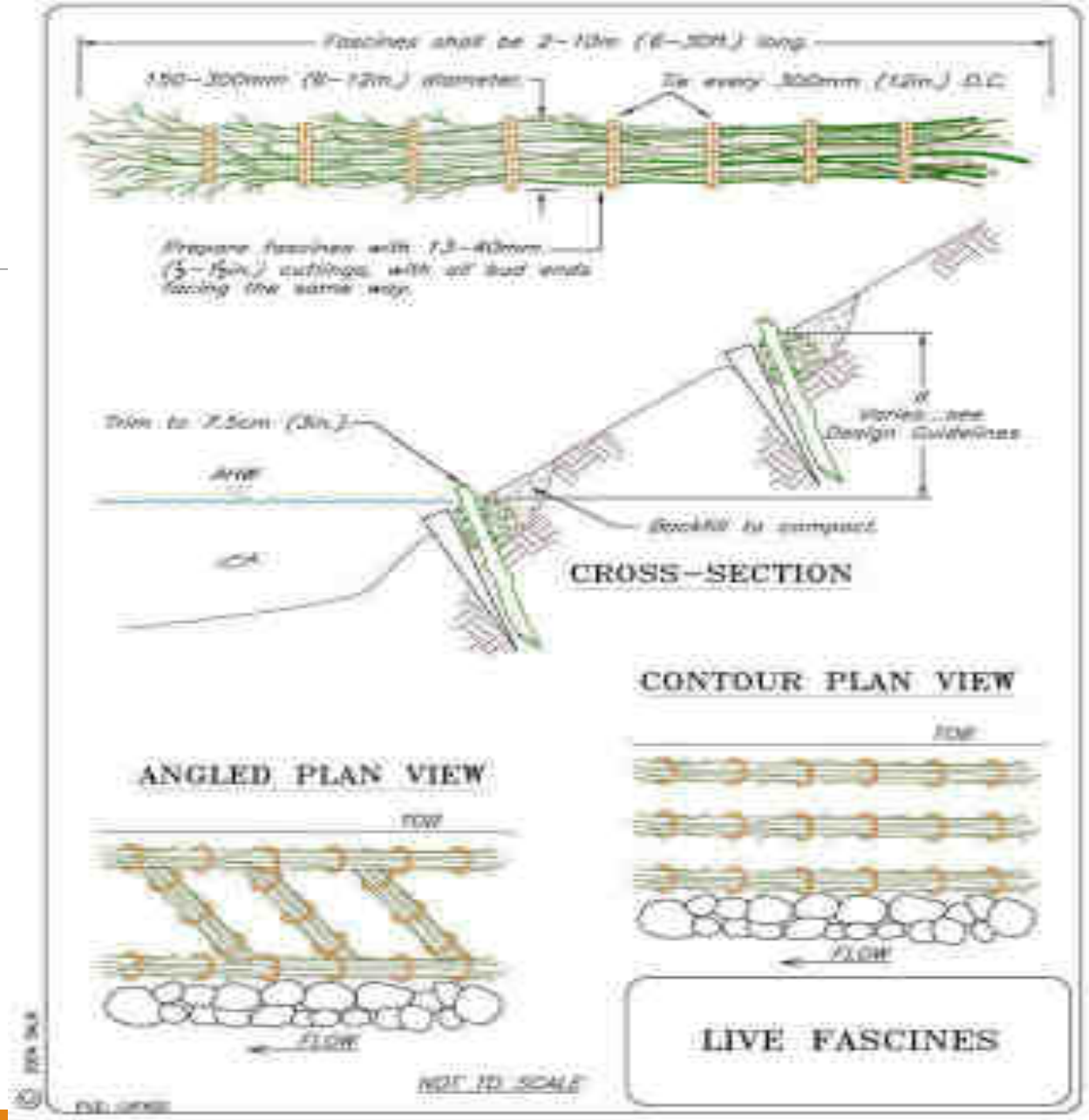
- Prevents progressive erosion and promotes siltation
- Aesthetically appealing
- Can be combined with other methods

Disadvantages:

- Higher labour costs
- Large amounts of material.

4. Fascines (bush wattles)

- Chestnut pegs (length 1.5-2,0 m diameter 4-5 cm) are driven into the soil (depth 0.7-1.2 m) every 30 cm between them.
- 60 living brunches/ m of Salix Vitex etc. are driven into the soil (length 1.0 m, diameter 1-5 cm) in two layers (they are built inclined) until to touch the equable part of slope.
- 30 of them are driven into the soil from one direction and 30 of them are driven into the soil from the other direction.
- The living brunches are covered with soil. (highet of soil 15 cm).


Fascines shall be 2-10m (6-30ft) long
150-300mm (6-12in) diameter
Tie every 300mm (12in) O.C.
Prepare fascines with 1.3-40mm (5-15in) cuttings, with all butt ends facing the same way.
Trim to 7.5cm (3in.)
Refer to Design Guidelines
Backfill to compact
CROSS-SECTION
CONTOUR PLAN VIEW
FLOW
ANGLED PLAN VIEW
FLOW
FLOW
FLOW
NOT TO SCALE
LIVE FASCINES

Advantages:

- Fast and simple construction
- Little soil movement
- Useful for wet slopes or zones
- Little preparation
- Promotes development towards climax

Disadvantages:

- Flexible branches necessary
- Susceptible to rockfall and shearing
- Little securing of deeper soil layers
- Labour intensive

5. Wood fences

- The right areas were the wood fences will be placed are chosen and lined on the surface soil.
- The right material for the construction is chosen and the required number of these dead parts are calculated from the market.
- The pegs are driven into the soil vertically in depth (0.40 m) (diameter 5-10 cm distance between them 0.80-1.00 m)
- Horizontal rods (diameter 4 cm) are fixed to the pegs with wire without gaps between them.
- When the length of rods is smaller than the length of fence the union between them must be done with other or peg.
- The length of construction must be broken up every 5 m to avoid the collapsing of the whole construction.

Advantages:

- Prevents progressive erosion
- Combined with other methods
- Aesthetically construction

Disadvantages:

- Labor intensive
- High construction cost

Conclusion

- In comparison with traditional engineering techniques, the non-technical benefits of plants are often stressed along with the usual technical advantages. Four general groups of benefits of biotechnical methods can be outlined:

1. Technical advantages:

- protection against surface erosion.
- an increase of slope stability by root reinforcement and draining of the soil
- protection against rock fall and wind.

2. Ecological advantages:

- regulation of temperature and humidity close to the surface, thus promoting growth.
- improvement of the soil water regime via interception, evapotranspiration and storage.
- soil improvement and top soil formation.
- improvement of and provision for habitat.

3. Economic advantages:

- reduction of construction and maintenance costs.
- creation of areas for agricultural and recreational use.

4. Aesthetic advantages:

- structures fit into the landscape.
- - landscape is more appealing.

➢ These advantages make biotechnical techniques a worthwhile consideration in slope restoration and protection works.

THANK YOU

Granular-Sub-Base (GSB works, Lesson learnt & challenges) share experience of Arbitration /dispute resolution

PRESENTED BY:-

TSHEWANG PELDON

AE

29/08/2023

PRESENTATION OUTLINE

- Project History.
- Arbitration
- Challenges.
- Lesson learn
- Way forward

Experience Challenges, lesson learn through Improvement of farm road at Yetong-Sangbari-Atingkhar Under Chaskhar Gewog about the GSB .

- Agency :- M/s Peldang Construction
- Location :- Chaskhar gewog.
- Awarded Amount:-23090600.00
- Duration :-6.5 Month
- Start Date :-03/12/2022
- End Date :-18/06/2023.
- Work order issue :23/11/2022
- Vide work order no:- MD/DES-21/22-23/3061
- Signing of Agreement :- 23 November,2023.

ISSUE TO PELDANG CONSTRUCTION, S/JONGKHAR

Site Possession Note issued on 6/12/2023.

Work started 7/12/2022

- with two excavator for subgrade preparation

Sample collection for Impact test 26/12/2022

- Sample collection done with the joint team from Gewog and contractor's representative
- Photo attached

Collection of sample for impact test on 26/12/2022

AGGREGATE IMACT VALUE test 07/01/2023

STORY,REVIEW ON THE GRADATION PROCESS

- Contractor started extracting GSP materials.
- While extracting the GSP materials, the contractor declined to do the steps of the gradation process and started laying without doing the Gradation test.
- the problem just started their, when I instructed the contractor about this situation , At first not only did he turn down the opinion but also i had to repeatedly asked him to do it

GSB Extraction started

GSB Gradation Test on 16/02/2023

Brief story of the project

AFTER THE GRADATION TEST, THE CONTRACTOR STARTED TO LAY GSB, BUT THE COMPLAINT WAS RECEIVED ON 28/2/2023, THAT THE GRADATION WAS NOT PROCESSING WELL.

ON 2/3/2023 I WITH THE QUALITY IN CHARGE AND FROM GEWOG ADMINISTRATION,CHASKHAR VISIT THE SITE AND INSTRUCTED THE PROPRIETOR, SITE ENGINEER, TO REDO THE GSB WORK DONE TILL APPA KARMA'S HOUSE AND PROPRIETOR CCEPTED. SO ON THAT SAME DAY, WE AGAIN COLLECTED THE SAMPLE FOR THE GRADATION TEST. WE WENT TO LINGMITHANG ON 3/3/2023 TO DO THE RE-TEST BUT UNFORTUNATELY IT FAILED.

SINCE THE GRADATION TEST FAILED, WE MADE AN APPOINTMENT TO DO THE GRADATION TEST ON 4/3/2023, I CALLED AND MASSAGE THE CONTRACTOR TO RE-PROCESS THE WORK, AND HE NEITHER PICKED UP THE CALL NOR READ THE MESSAGE. NEXT DAY ALL THE RESOURCES WERE LIFT FROM SITE. FROM THAT, THE PROBLEM ARISES, BUT HE WAS NOT BOTHERED AT ALL. EVEN AFTER ONE MONTH, THE WORK WAS STILL PENDING SO I PUT UP TO DTC FOR THE DISCUSSION.

NOTICE OF TERMINATION WAS ISSUED TO THE CONTRACTOR STATING THAT WITHIN 10 DAYS IF HE DID NOT START THE WORK HE WOULD BE TERMINATED. EVEN AFTER 10 DAYS, THE CONTRACTOR REFUSED TO WORK.

WHEN I AND THE JOINT TEAM FROM GEWOG VISIT THE SITE ON 25/4/2023 THE WORK THERE WAS STILL IDLE. SO WE HAVE PUT UP TO DTC AND WAS TERMINATED ON MAY 31,2023. AFTER THAT THE CONTACTOR HAS PUT IS OPINION TO THE ARBITRATION STATING THAT HIS WORK WAS TERMINATED AND HE WILL NOT ACCEPT THE TERMINATION. AS HE RESUME HIS WORK ON TIME BY ONLY ONE EXCAVATOR THAT HARDLY WORK FOR AN HOUR ON 21ST APRIL,2023.

Challenges

- When contractor lies saying that his excavator was in full swing from the day he starts to until termination order issue.
- He lies saying he was not informed or requested to join the team during any of the test conducted.
- He lies saying his equipment are at site within the notice of termination period.
- Lies saying he was move from the site due to hindrance cause by parked truck, dry wall and less width of the road.
- Lies saying due to hinderance his resources are parked idle and claiming idle charge. This are the challenges face during our Arbitration case, but due to our call history and massages save, correspondence letter issue, tour report as a evidence ,we didn't face problem writing his response.

LESSON LEARN

DOCUMENTATION:

-RECORD KEEPING FOR THE TEST RESULT FOR EVERY STEP OF TEST CONDUCT.

- CONVERSION SHOULD BE DONE THROUGH MESSAGES OR THROUGH EMAIL WHICH BOTH PARTIES CANNOT

DELETE EACH OTHER LATER ON.

- KEEP A RECORD OF EVERY STEP FOR WHAT WE FOLLOW UP WITH THE OTHER PARTY.

- MAINTAIN HINDRANCE REGISTER.

- MAINTAIN SITE ORDER BOOK.

MAINTAIN COMPREHENSIVE RECORDS THROUGHOUT THE GSB CONSTRUCTION PROCESS, INCLUDING MATERIAL TESTS, COMPACTION RECORDS, AND ANY DEVIATIONS FROM THE PLAN.

LESSON LEARN

- PLANNING,
- COMMUNICATION,
- TO BEST PRACTICE

CAN HELP IMPROVE THE QUALITY AND EFFICIENCY OF GSB WORK IN FUTURE PROJECTS.

BRIEF ABOUT ARBITRATION

BHUTAN ALTERNATIVE DISPUTE RESOLUTION CENTRE

THE FIRST PARLIAMENTARIAN ENACTED THE ALTERNATIVE DISPUTE RESOLUTION ACT OF BHUTAN ON 25TH DAY OF FEBRUARY 2013.

AND ACCORDINGLY BHUTAN ALTERNATIVE DISPUTE RESOLUTION CENTRE (BHUTAN ADRC) WAS ESTABLISH AND STARTED FUNCTIONING FROM 15TH MAY 2018, AND IT DEFINES AS AN INDEPENDENT BODY, HAVING A DISTINCT LEGAL PERSONALITY, AND CAPABLE OF DOING ALL COMMERCIAL RELATED DISPUTE THROUGH ARBITRATION AND NEGOTIATION. BHUTAN IS 151 STATES PARTY IN THE NEW YORK CONVENTION

Functions of the Centre

- The Centre serve as a neutral, efficient and reliable dispute resolution service center and
- Carry out administrative and secretarial functions for the dispute resolution proceeding
- Provide expertise in the field of alternative dispute resolutions to the stakeholders
- Provide training to the people who are involved in the Alternative Dispute Resolution
- Certify an arbitrator who is trained by the Centre
- Accredit other qualified arbitrators

From my experience about Arbitration

- If I share few things from my experience attending the arbitration.
- The arbitration is between M/s Peldang Construction Pvt. Ltd, Thimphu, hereinafter **"Claimant"** and Dzongkhag Administration, Mongar, hereinafter **"Respondent"**, collectively referred to as the **"PARTIES".**

Main point submitted by the Claimant are listed below.

- Work going on full swing was stopped on 2nd March, 2023 by the Quality and the Site Engineers and stoppage of the Work was irrelevant.
- Loss to the Contractor
- Involvement of non- technical to collect the sample from the site for second test
- False information of Two Excavators off-road

- *Loss incurred Nu. 211, 600.00 per day due to the Work stopped and the equipment and HR remained idle.*
- *Subject matter vide the Contractor's letter no. PCPL/Adm-7/2022-2023/nil dated 06/3/2023 neglected/ignored till date*
- Tender committee violated clause SCC 10.1
- Hindrances at the site and thus, obstruction for compaction
- Site Supervisor submitted a Work plan and QAP.

  Accepted by DA
- False information reported by the site engineer to the client.
- capture of photos without permission.
- Legal proof of POL purchase challan 19th, 21st and 24th April 2023.

- Contract terminated on false information and report by the site engineer
- All equipment have been transported to Mongar on 5th May, 2023
- Dasho Dzongda, Dasho Dzongrab & CDE decided on the false information

But our(Respondent) main Point of termination is due to

- in line with the contract agreement GCC clause 59.2(a) - ***'the Contractor stops work for more than 30 days when no stoppage of work is shown on the current Program and the stoppage has not been authorized by the Project Manager'.*** we are strict in to this point.
- **Follow up with Contractor**

Clamant did not respond to site engineers call on 3rd and 4th march,2023,but refuse to corporate and conduct the gradation tests, while the the clamant had concurrently & systematically demobilized, lift and divert the committed resources from the work side in a planned manner so after one month of stoppage of work, we issued a Notice of termination

Claimants claims

Sl.no	claimants claim		Admitted by Tribunal	Remarks
1	Supply & stacking of materials of GSB	Nu13,754,964.60	Nu00.00	
2	Providing and laying GSB	Nu. 763,875.00	Nu.00.00	
3	Preparation of subgrade	393,750.00	Nu.177,695.92	
	Equipment Idle Charge	0.00	0.00	Revoked by Claiment
A	Total	**14,912,589.600**	**177,695.92**	

Respondent's claims

Sl.no	Respondent claim		Admitted by Tribunal	Remarks
1	10%of initial contract price	Nu2,309,060.00	2,309,060.00	As per contract
2	Mobilization recovery	Nu. 4,618,120.00	4,618,120.00	recovery
3	Non deployment of equipment	4,065,375.00	0.00	As justified
4	Non deployment of man power	180,000.00	0.00	As justified
B	Total	11,172,55.88	6,927,180.00	
	Total A+B	26,085,145.48		
	Final liability of claimant		6,749,484.08	

TRIBUNAL RULES THAT

- Since the non-deployment of resources has led to non-performance by the contractor ultimately leading to termination of the contract, the claim for non- deployment is not admissible as the claimant is already penalized through termination of the contract.
- The Claimant is liable for 10% of initial contract price NU 2,309,060.00 as per (GCC60.1).
- The recovery of mobilization advance Nu 4,618,120.00 is admissible. Hence the claimant is required to refund the mobilization advance.
- The interest claim Nu.461,120.00 against the mobilization amount Nu.4,618,120.00 is not tenable as it was not set out in the contract.

TRIBUNAL RULES THAT

- GCC 25.2 stipulates the cost of adjudication to be equally borne by the contractor and the employer. The dispute is arbitrated as per ADR Act 2013 and all expenses related to arbitration shall be as per the clause 139 of ADR act 2013 and administrative fees determined by the ADR Centre.
- Nu.396,000.00 claimed as TADA expenses for the Attorneys, Nu 360,000.00 for compensatory damages for loss of professional time and disruption of public delivery, Nu 405,966.67 for diverting the resources, and Nu. 4,059,666.67 for non- deployment of equipment and manpower(13/12/2022 to 1/5/2023(if contract is restituted) by the respondent, are observed outside the ambit of the contract and hence dismissed.
- Nu.483,000.00(Nu.123,000.00+360,000) claimed for no deployment of key personal and equipment is dismissed as such damages cant exceed 10 % of initial awarded contract price.
- Nu.633,600.00 as withdrawn by the claimant is endorsed

- .The Claimant is liable for Nu. 6,749,484.08 after adjusting Nu177,695.92 for value of the work executed under the contract.

WAY FOREWARD

- Project Planning.
- Careful during the preparation of tender document
- Careful during evaluation regarding bid price.
- Timely monitoring report should be submitted to supervisor.
- Keep Documentation.

THANK YOU

7. Genjas and Commitments
By
Geog & Dzongkhag

6. Village Mapping II
Confirmation of Layout and Tapstand Positions

5. Branch Network Survey and Tapstand Positioning
After FCR

4. Transmission Pipeline Survey
Up to FCR

3. Source Investigation
Suitability, Yield and Ownership

2. Village Mapping I
Household Locations and Preliminary Layout

1. Introduction Meeting
Objectives & CPMW

7-RWS SURVEYING STEPS

1. Introduction meeting

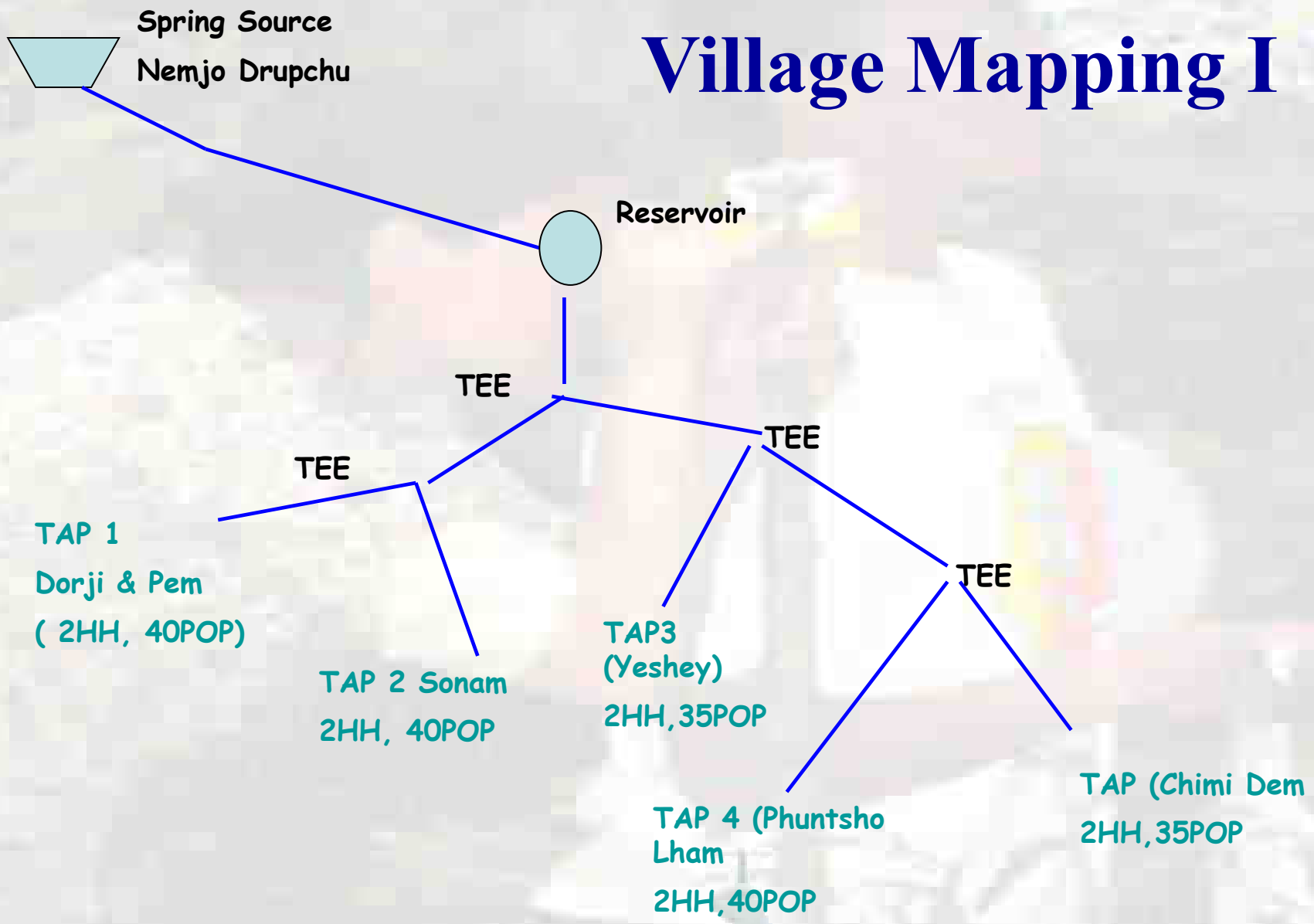
- Community members must be aware of the procedures
- The community must show commitment
- Clear instruction to them who is taking part in the survey

2. Village mapping I

- The surveyor will have a preliminary idea household/population in the village
- To resolve conflicts on source and land ownership
- The community participation in a planning process will take a leading role

2. Village Mapping-I

Village Mapping I



VILLAGE: NEMJO	DZONGKHAG: PARO
GEOG: SHABA	DRAWN BY: KARMA

Daily Demand

- Present population (PP)
- Design period (*yr*)
  - 10 years, 15 years and 20 years
- growth rate (*r*) – 2%

$$pgf = \left(1 + \frac{r}{100}\right)$$

Consumer type	Consumer rate
Villager/Staff Qtr	95 ltr/day/person
Semi Urban	135 ltr/day/person
Day School	50 ltr/day/student
Boarding School	135 ltr/day/student
BHU/Hospital	500 ltr/day/bed
Office	50 ltr/day/offices

Daily Demand = PP x Consumer rate x pgf

Example

If growth rate (r)= 2% and Project life Span =20yrs

Substituting in the formula

$$pgf = \left(1 + \frac{r}{100}\right)$$

We get Population Growth Factor (PGF) = 1.49

If Present population = 200 p

Consumer type = Average

Therefore, Consumption rate = 95 l/day/person

Daily Demand = PP x Consumer rate x pgf

Daily Demand = 200 x 95 x 1.49 = 28,310 liters per demand.

RWS Survey

RWS Survey Equipment's cont….

Calculator

- Use Scientific calculator to calculate vertical height.

Container and time recorder

- Use the container that easily can calculate volume
- Volume should not be less than 10 liters
- Use watch/cell/stop clock to record time

- The source yield must be measured during dry season i.e. March, April and May and it should be adequate for current and future.
- An assessment of the source technically feasibility, safe from landslides, floods and contamination
- When indicated, a water sample must be collected for bacteriological testing.
- Source ownership must be clear with agreement (genja) signing.

Source

- **Type of sources**

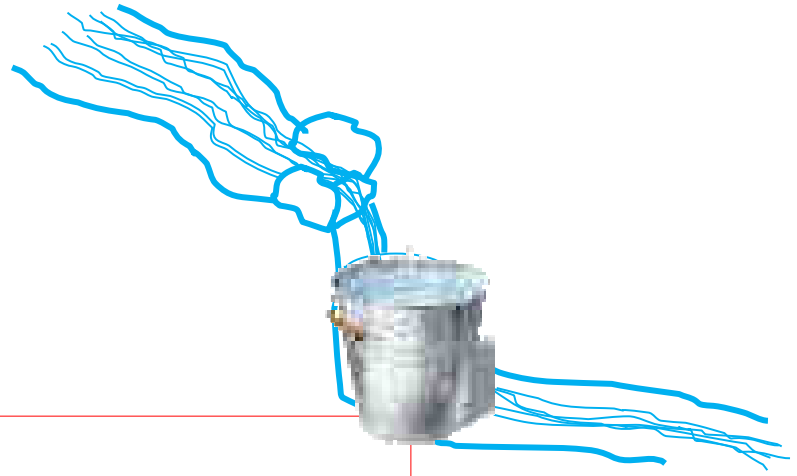
  -

Method of Flow (Q) measurement

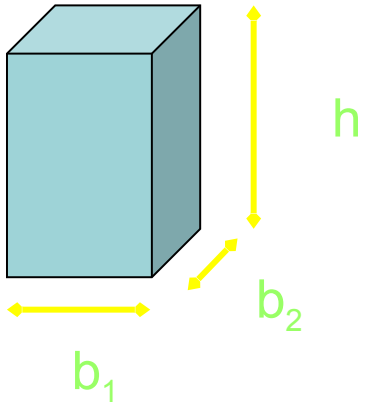
Container and stop watch Method

* 0.7 *lps*

Container and stop watch Method



cm³



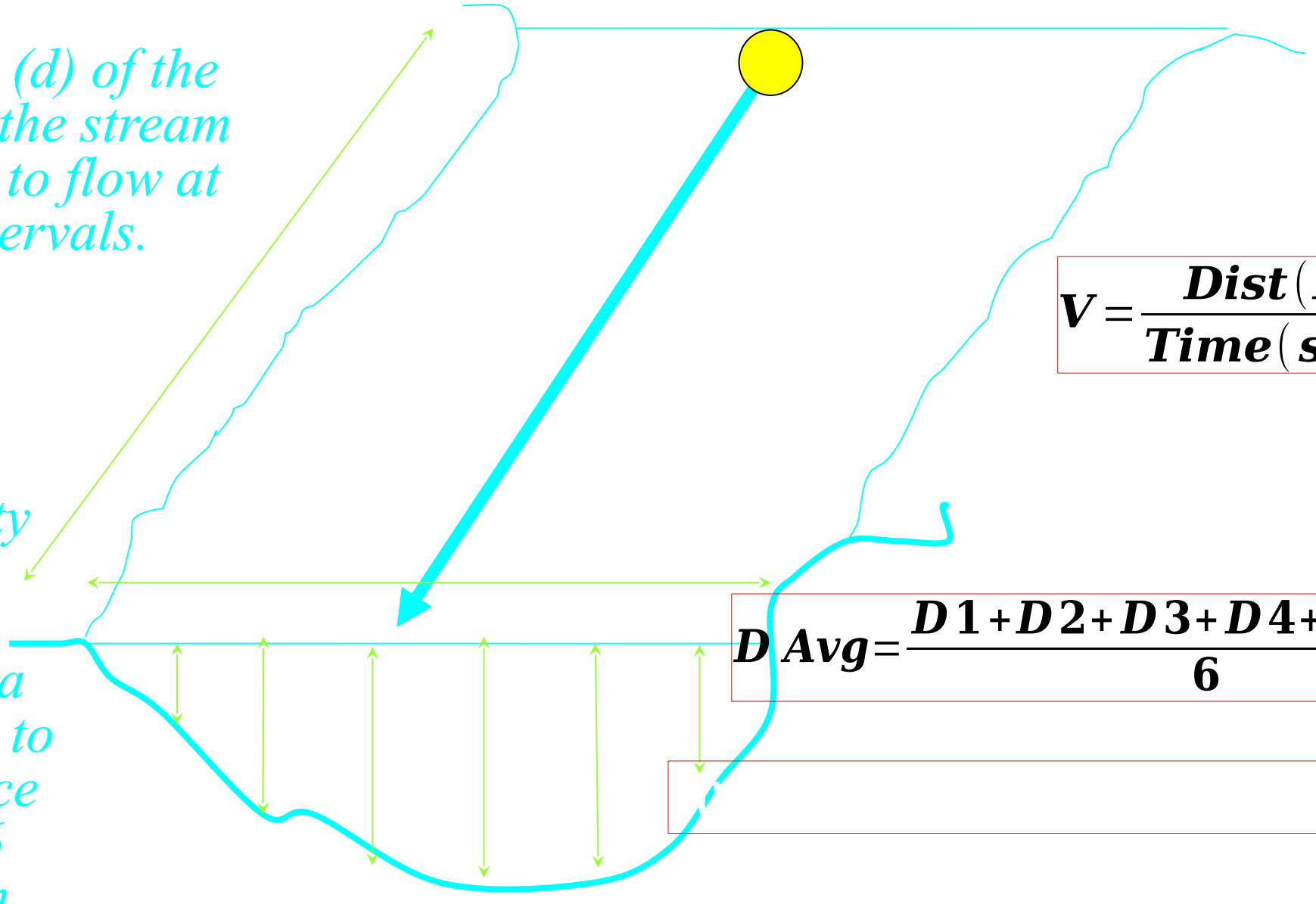
$$Vol = \frac{\pi}{4} * \frac{\left(\frac{d_1 + d_2}{2}\right)^2}{1000} * h \; ltrs.$$

$$Vol = \frac{h * b_1 * b_2}{1000} \; Ltrs.$$

$$Q = \frac{Vol}{time} \; lps$$

*0.7 lps

Average depth (d) of the stream across the stream perpendicular to flow at equidistant intervals.

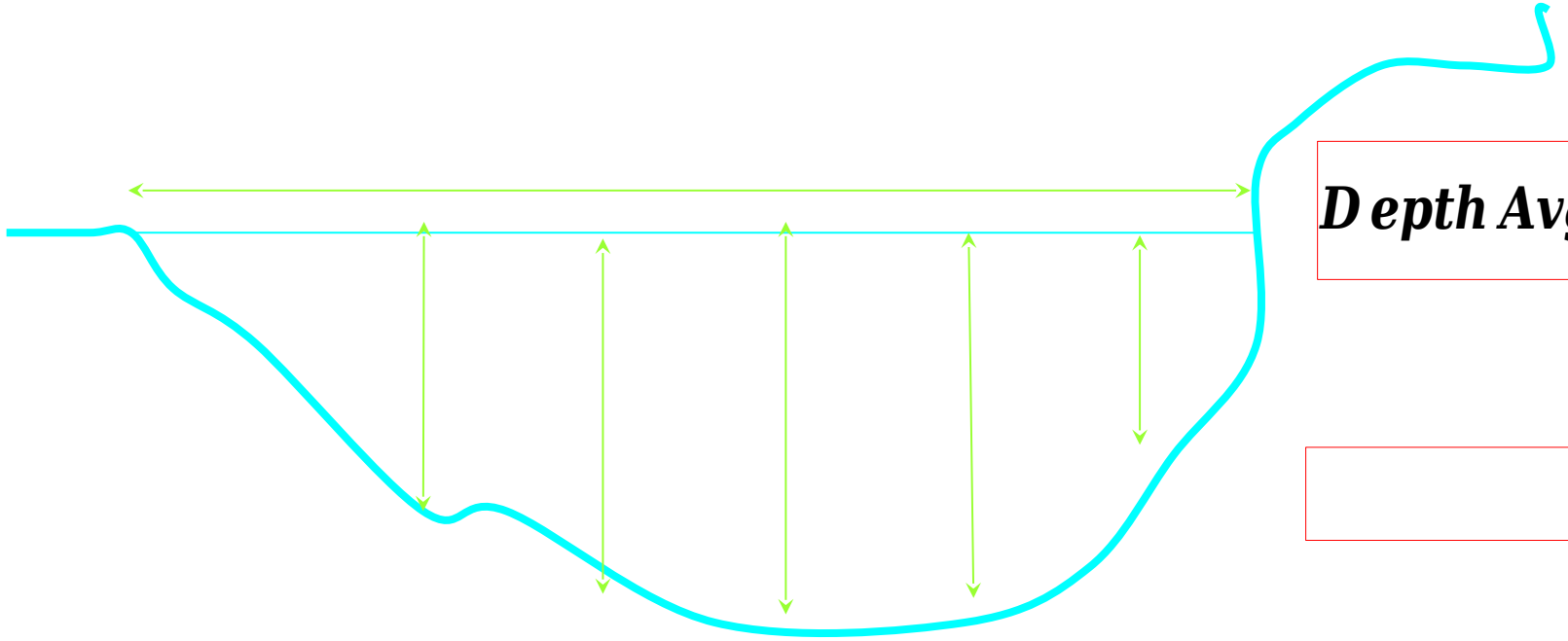


$$V = \frac{Dist(L)}{Time(sec)}$$

Surface velocity (Vel) which is determined by time taken by a floating object to cover a distance greater than 6 times the depth

$$D\,Avg = \frac{D1 + D2 + D3 + D4 + D5 + D6}{6}$$

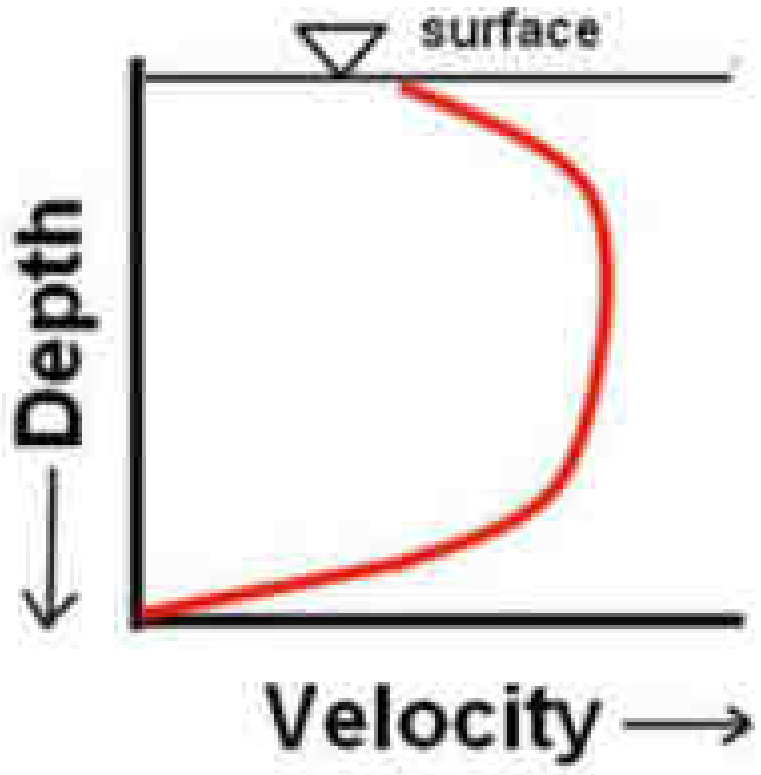
Cross sectional area



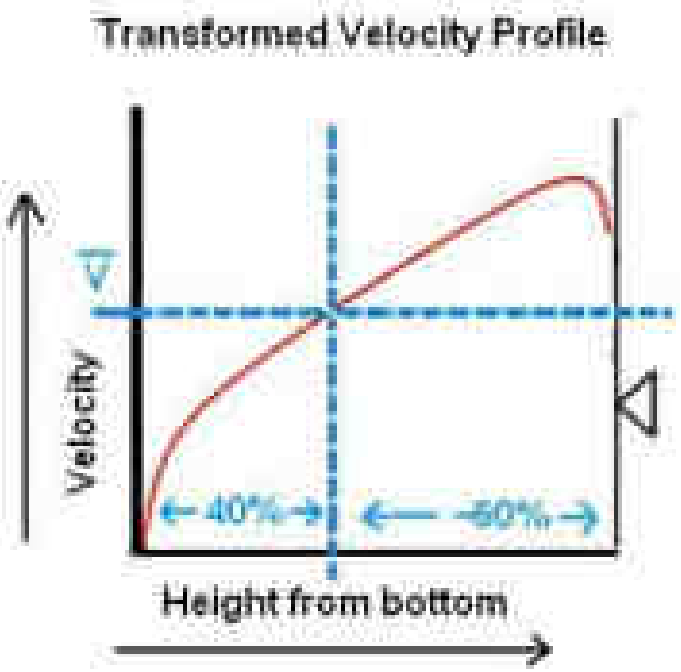
$$Depth\ Avg = \frac{D1 + D2 + D3 + D4 + D5 + D6}{6}$$

Velocity

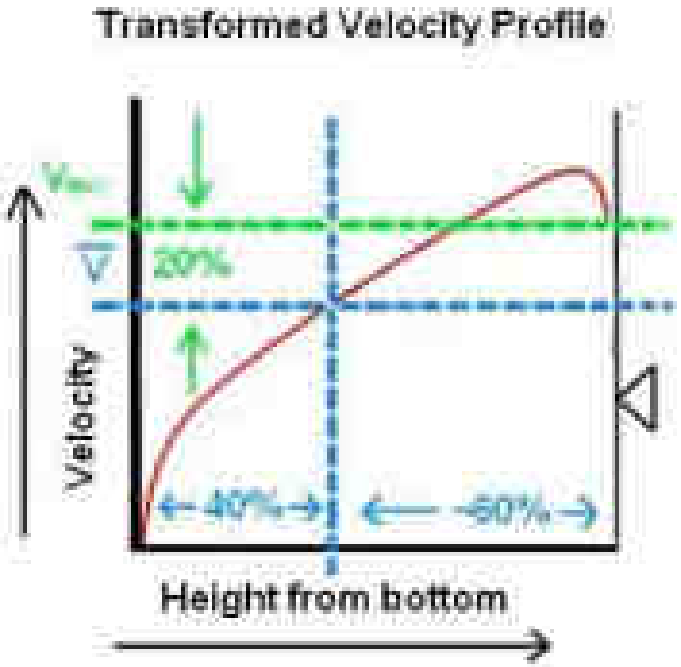
- At bottom due to water and solid boundary
- At surface due to air and water boundary



- Average velocity occurs at 60% of the depth.



- Average velocity is usually 20% slower than the surface velocity



Velocity /Float Method

*Values for **Velocity correcting factor** **C** are as follows:*

C= 0.85 for concrete, rectangular and smooth

C=0.75 for wide river, clam, free flow where cross Area > 10m²

C=0.65 for shallow river and free flow where Area <10m²

C=0.45 If shallow stream >=.5 and < 0.8m and turbulence flow

C=0.35 If shallow is between 0.2m and 0.5m and turbulence flow

C=0.25 If shallow < 0.2m and turbulence flow

$$Q = c * Vel * Area * 1000$$

$$Q = c * \frac{Dist}{Time} * Avg(depth) * Width * 1000$$

Formulas (H in meters): L/S = 1380 Hm 2.5 M3/HR = 4969 Hm 2.5

Weir or V-notch method

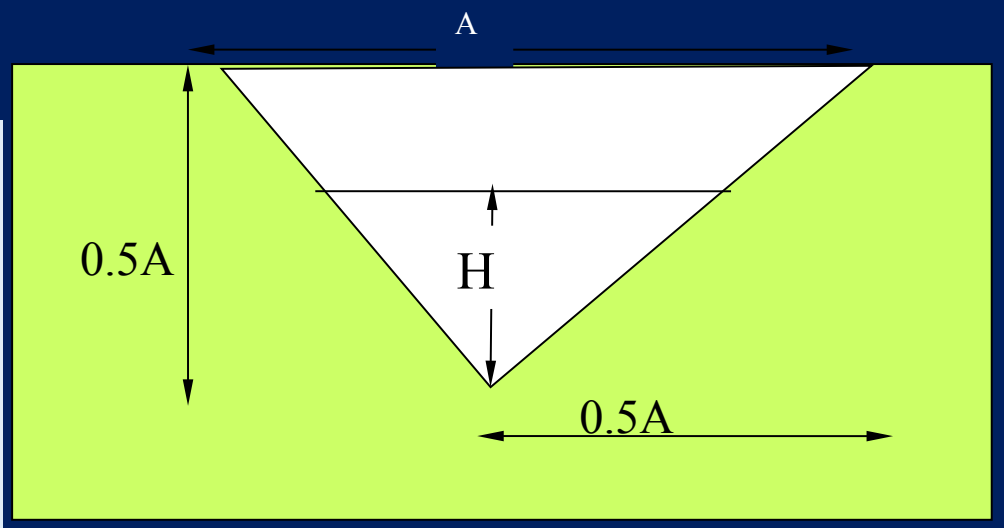
$$Q_{90} = 0.0154H^{2.47}$$

$$Q_{60} = 0.0078H^{2.51}$$

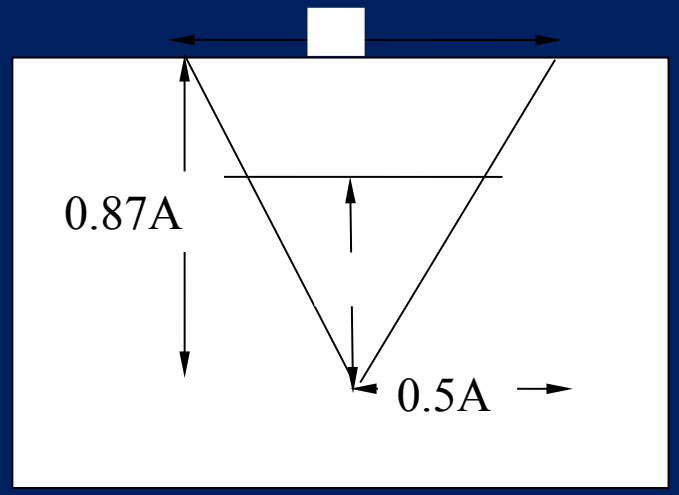
Where

$$Q = Measure..flow(lps)$$

$$H = waterlevel(cm)$$



90 ⁎
Notch



60 ⁎
Notch

Daily Supply

Example:

If flow (Q) is 0.9 lps

Therefore **Daily Supply** = (0.9 x 70%) x 86400

= 54,432 litres

Daily Supply should be greater than Daily Demand

Daily Supply > Daily Demand

54,432 litres > 28,310 liters

Source is sufficient for 200 people

Table -1 Physical Parameters (Urban)

Sl.No	Parameter	Unit	Maximum permissible Limit
1	Colour (TCU)	Hazens Unit	15
2	Odour	-	non-objectionable
3	pH	-	Acceptable range 6.5 – 8.5
4	Taste	-	non-objectionable
5	Turbidity	NTU	5

Table-2 General Chemical Parameters causing undesirable effect (Urban)

Sl.No	Parameter	Unit	Limit
1	Calcium	mg/L	No permissible limit but recommended < 75
2	Free Residual Chlorine*	mg/L	Target range 0.2 – 0.5
3	Iron	mg/L	No permissible limit but recommended < 0.3
4	Manganese	mg/L	0.4* Maximum permissible limit
5	Sulphate	mg/L	No permissible limit but recommended < 250

** Chlorine residual must be maintained throughout the distribution system*

Table-3 Chemical Parameters of health concern (Urban)

Sl.No	Parameter	Unit	Maximum permissible Limit
1	Fluoride (to be tested for ground and spring water only)	mg/L	1.5
2	Nitrates	mg/L	50
3	Arsenic	mg/L	0.01
4	Lead	mg/L	0.01
5	Mercury	mg/L	0.006

Table-4 Microbiological Parameters (Urban)

Sl.No	Parameter	Unit	Maximum permissible Limit
1	E.Coli	CFU/100ml sample	0

Table -7 Physical Parameters (Rural)

Sl.No	Parameter	Unit	Target limits
1	Conductivity	µS/cm	1000
2	Odour	-	Un-objectionable
3	Appearance		Un-objectionable
4	pH	-	6.5 – 8.5
5	Taste	-	Un-objectionable
6	Turbidity	NTU	5

Table -8 Microbiological Parameters (Rural)

Sl.No	Parameter	Unit		Risk Assessment
1	E.Coli	CFU/ml	0	Safe Water
			1 - 10	Low Health Risk
			11 - 50	Intermediate to High Health Risk
			>50	Grossly Polluted

4. Transmission Pipeline Survey

- The layout of the transmission pipeline from the source to reservoir is traverses a path that is economical ensuring the technical survey norm.

5. Branch Network Survey and Tapstand Positioning

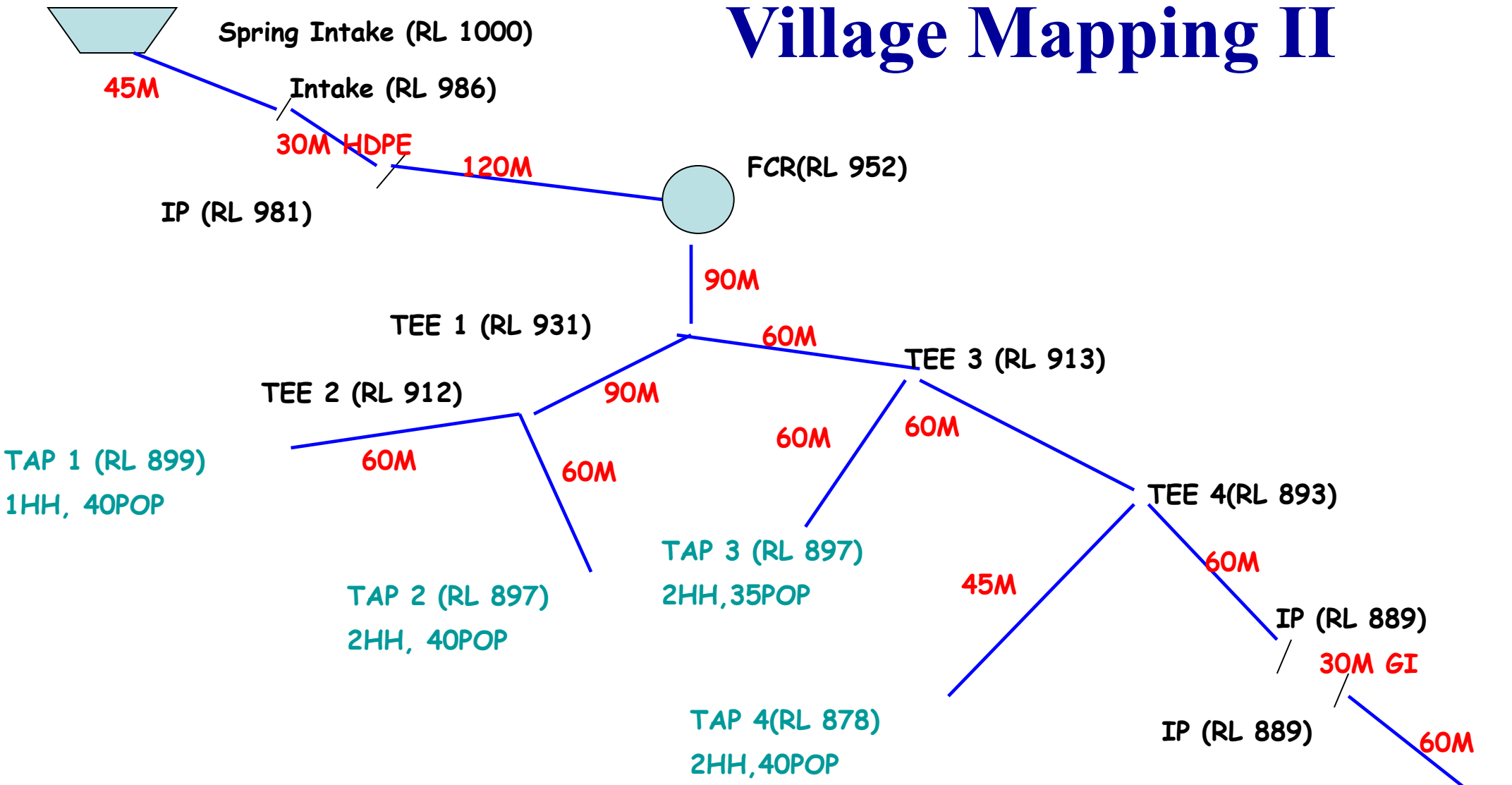
- The owners of the land through which the pipe passes must agree to its placement so that no future conflicts will arise.
- Criteria for Tapstands

6. Village Mapping -II

- After the technical survey, surveyor should complete all the calculation and plotting of detail site plan and confirm with the community before he/she leaves the site.

It is not the surveyor's responsibility to solve the conflicts

Village Mapping II



VILLAGE: NEMJO	DZONGKHAG: PARO
GEOG: SHABA	DRAWN BY: KARMA

7. Genjas & Commitments

Community self commitments

- Free of source ownership conflict
- All landowners having land upon which the scheme structure or pipelines lie should agree to the use of their land for construction

Community commitments to Dzongkhag

- Responsibility for organizing and supervising unskilled labour
- Responsibility for transporting supplied materials from the road-head
- Responsibility for collecting and transporting local materials

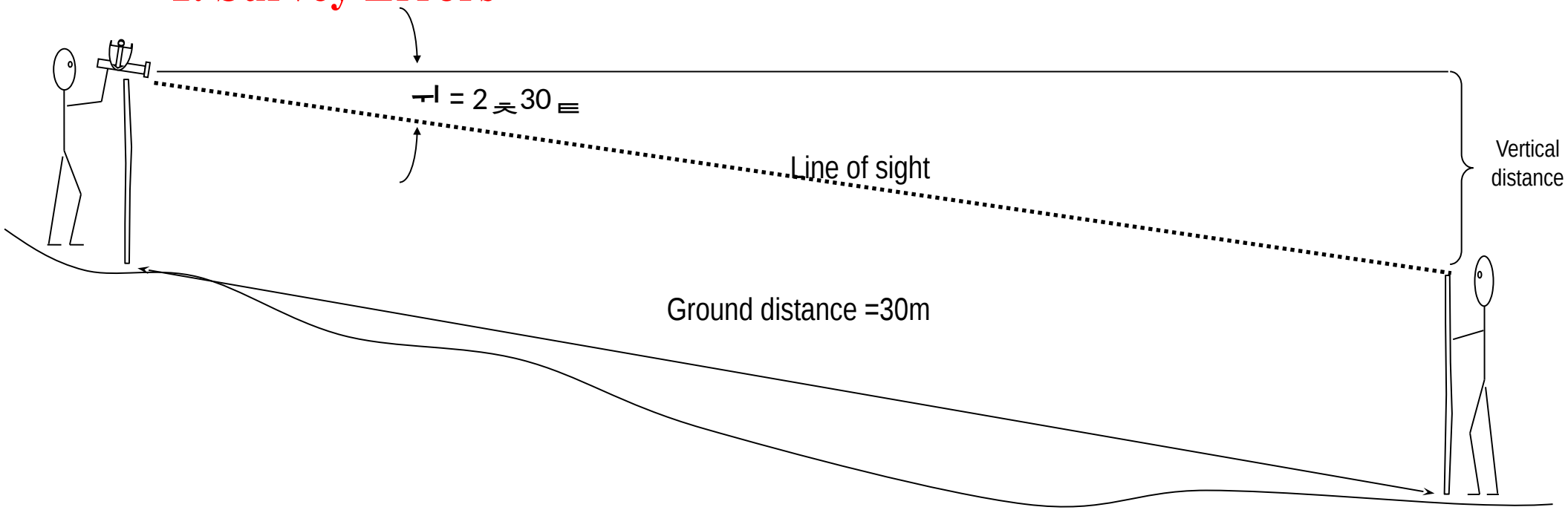
Dzongkhag/Geog commitments to the community

- Facilitate a community to lead survey and implementation planning process
- Scheme technical design and estimate
- Skill labour
- Non-locally available materials and their transport to the road-head
- Construction quality supervision
- Provide CPMW and caretaker training

Survey Errors

1. Surveying error
2. Human
3. Equipment
4. Filling Survey Form & Referencing
5. Calculation using calculator or Microsoft Excel

1. Survey Errors

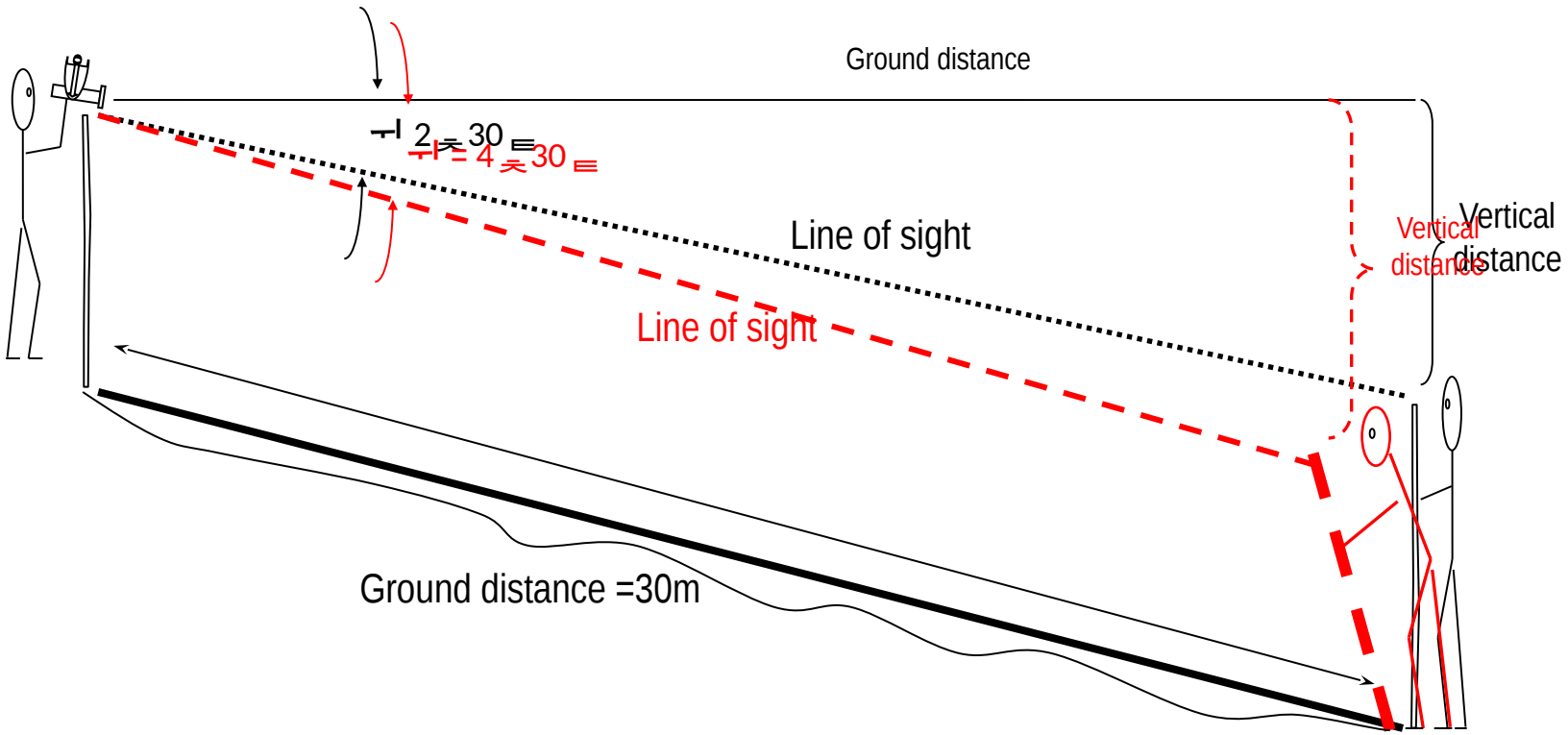


Vertical distance = Ground Distance x Sine

Example: =- 2 30 ground distance = 30m

Vert. Dist. = 30m x –(Sin 2 30°)

= 30 x 0.0436 = -1.31m



Ground distance = 30m,

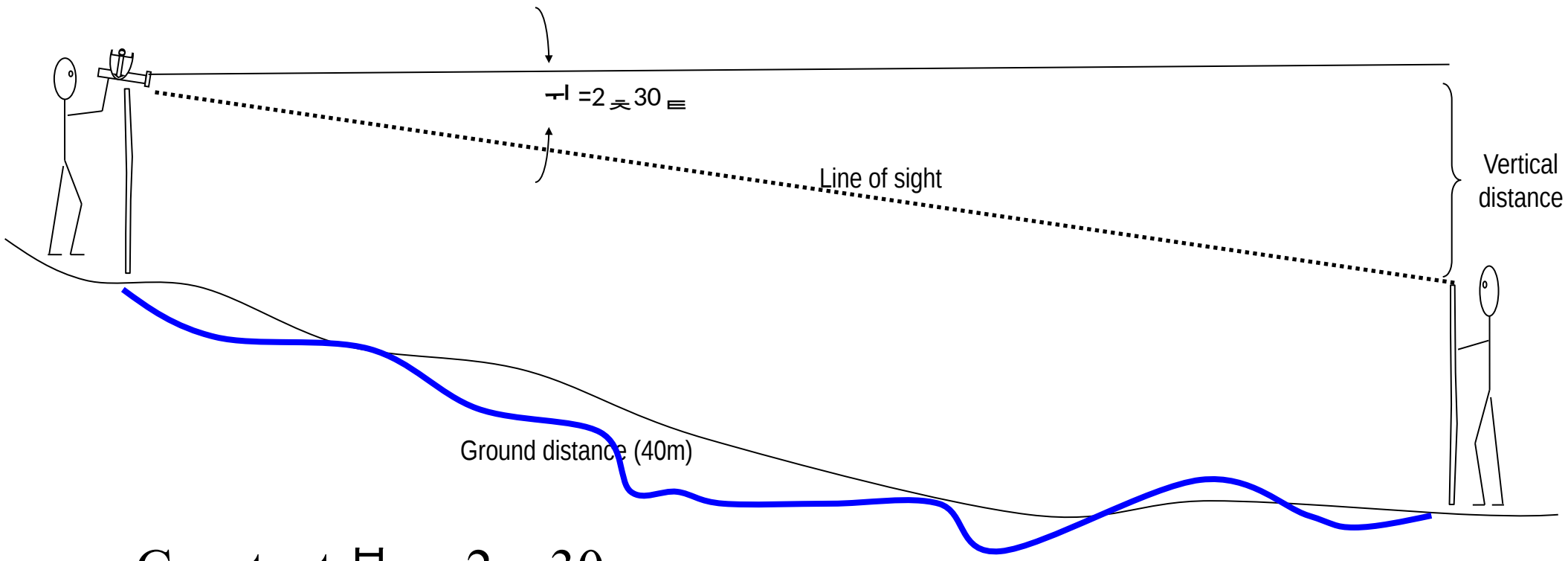
Previous angle = - 2°30′ ⇒ V.Dist = 30*-(Sin 2°30′)= -1.31m

Now = - 4°30′ ⇒ V.Dist = 30*-(Sin 2°30′)= -2.35m

Difference = 1.04m

What do you need at a distance of 1.8km?

One extra BPT



Constant = - 2 x 30 m

Previous Ground distance = 30m, Vert.Dist.= - 1.31m

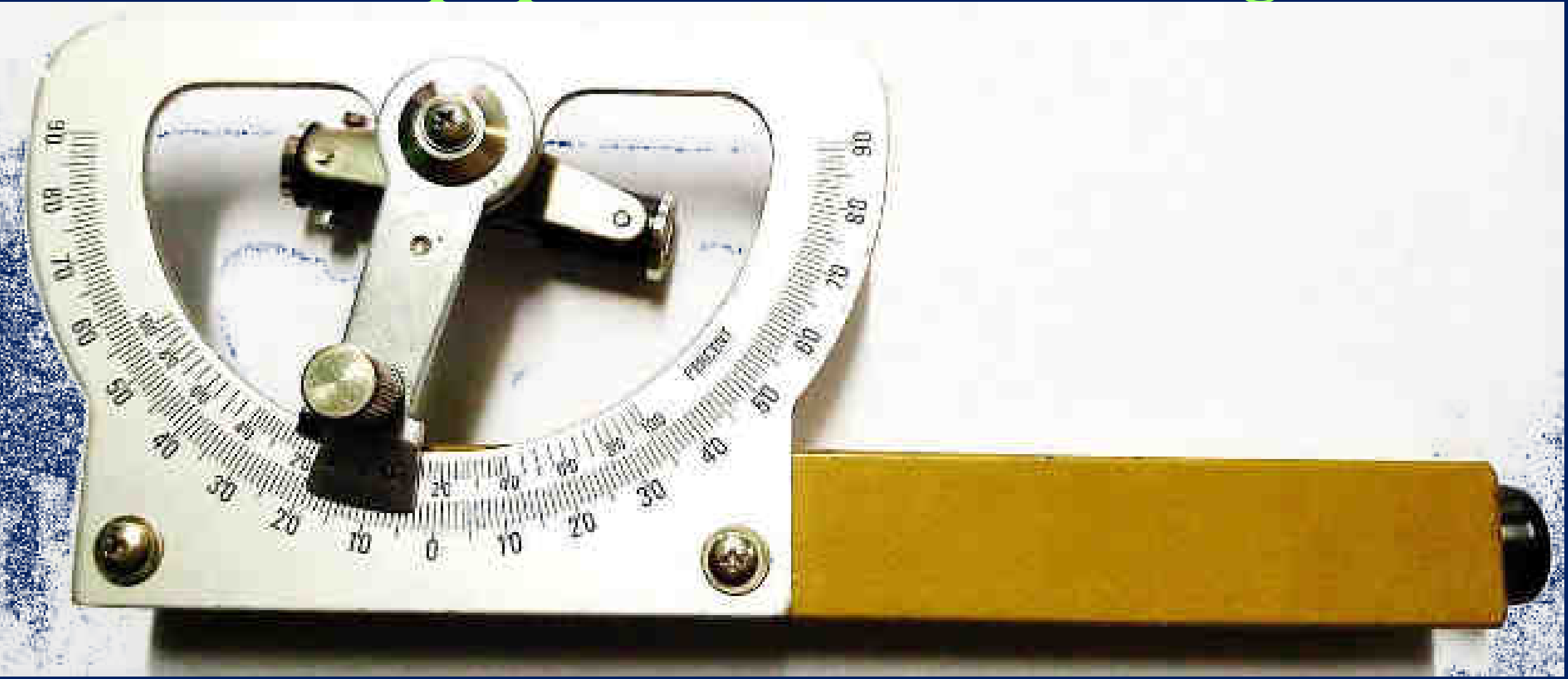
Now Ground Distance = 40m , Vert.Dist.= - 1.74m

Difference = 0.43m

Total difference = 1.04 + 0.43 = 1.47 = 1.5m

3. Equipment Errors

Equipment Error Checking



To ensure Abney Level

- Spirit Level Method
- Two Post Method

Spirit Level Method

- Simplest way to calibrate an Abney level is to set the pointer exactly to zero and place it over a spirit level.
- If the bubble of Abney level is not at centre then it needs to be calibrated.
- Calibration is done by adjusting the differences in the field book.

Calibration

- find the error deviation (⩵).

- If error deviation is by +ve 2 ⩵ then correct every angle reading by decreasing by 2 ⩵ in the field book

- If error deviation is by –ve 2 ⩵ then every angle reading by increasing by 2 ⩵ in the field book

4. Survey Form Filling

Stn	Abney Level	Ground dist	Vert. Dist.	Cum. Dist.	RL	Pipe Type	Tee/Tap / FCR	Remarks
4		VD=Sin(∠I) * GD			965.79			THROUGH JUNGLE
	13	60	13.49	(-)		HDPE		
5					952.3			PROPOSED FCR
	10	30	5.20	(-)		GI		Road crossing
6					947.1			
	15	60	15.52			HDPE		THROUGH FIELD
7					931.58		TEE 1	

4. Survey Form Filling cont…

Stn	Abney Level	Ground dist	Vert. Dist.	Cum. Dist.	RL	Pipe Type	Tee/Tap / FCR	Remarks
7					931.58			TEE -1
	13	60	13.49			HDPE		THROUGH FIELD
a					918.09			
	10	30	5.21			GI		THROUGH FIELD
b					912.88		TEE -2	
	15	60	15.23			HDPE		THROUGH FIELD
c					897.65			

4. Survey Form Filling cont…

Stn	Abney Level	Ground dist	Vert. Dist.	Cum. Dist.	RL	Pipe Type	Tee/Tap / FCR	Remarks
c					912.88		TEE -2	
	13	60	13.49			HDPE		THROUGH FIELD
c1					899.39		TAP -1	SANGAY ZAM (1HH,8POP)
	15	60	15.53	(-)				THROUGH FIELD
d					883.86	HDPE	TAP -2	DORJI & CHODEN (2HH,18POP)

Survey Form Filling cont…

Stn	Abney Level	Ground dist	Vert. Dist.	Cum. Dist.	RL	Pipe Type	Tee/Tap / FCR	Remarks
c					912.88		TEE -2	
	13	60	13.49			HDPE		THROUGH FIELD
c1					899.39		TAP -1	SANGAY ZAM (1HH,8POP)
c							TEE -2	
	15	60	15.53	(-)		HDPE		THROUGH FIELD
d					897.35		TAP -2	DORJI & CHODEN (2HH,18POP)

5. Calculation using calculator or in Microsoft Excel

VD = Sine(ㅓㅣ) * GD

* **In Excel:** degree value should convert to radian (multiply by ㅁ /180)

p should be written as Pi()

* 4ㅅ 20” should convert to Degree Decimal

(4 + 20ㄴㅅ 60) converts to Degree Decimal

* 4ㅅ 20” should not enter both in calculator and Excel as 4.20

- Design and functionality of scheme = quality of technical survey

- Poorer participation during the survey = poorer the community ownership and management of the scheme

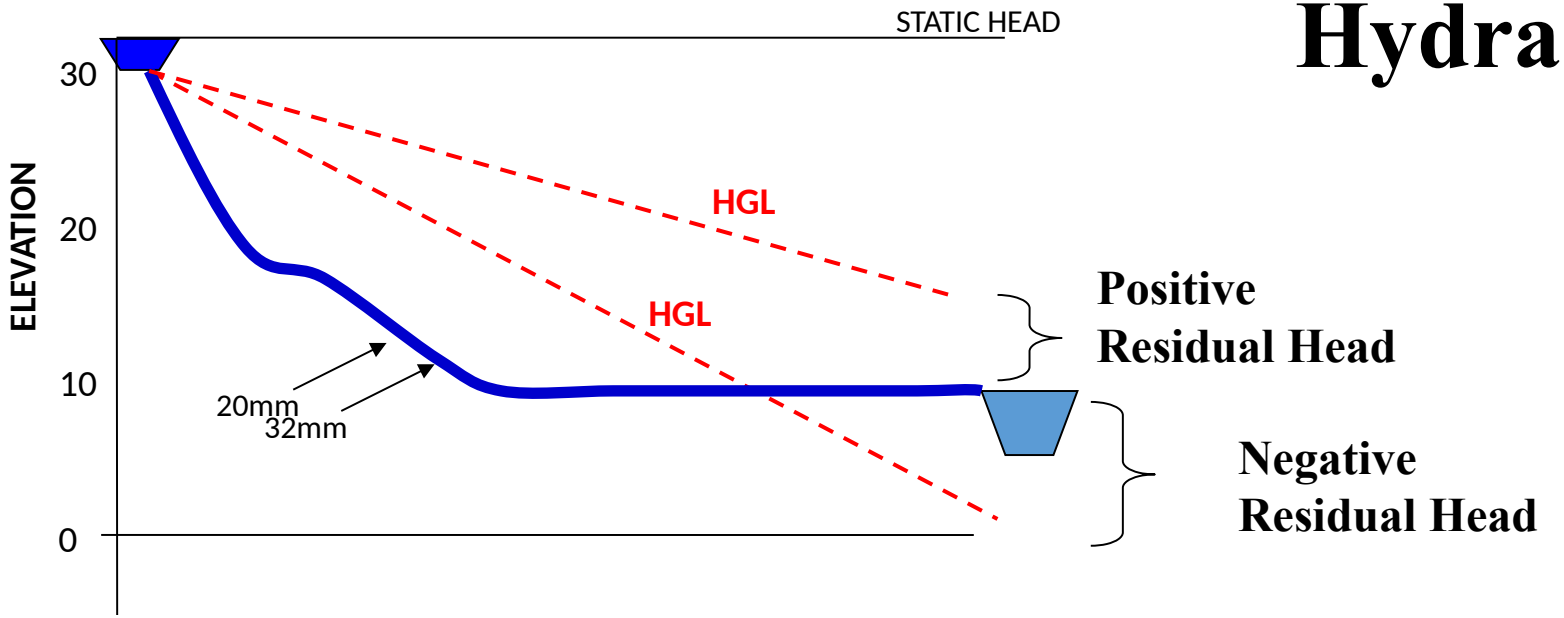
“Take time with a survey, never do it in haste”

Hydraulic Concept

Why we need to do hydraulic design?

- To deliver water to consumer with appropriate quality, quantity and pressure
- To economize the cost by selecting appropriate pipe diameter
- To keep provision for future extensions

Hydraulic Concept



Negative residual head (Negative pressure)

Negative residual head is a pressure in the pipe line below the local atmospheric pressure. Such pressure should be avoided due to the following reasons:

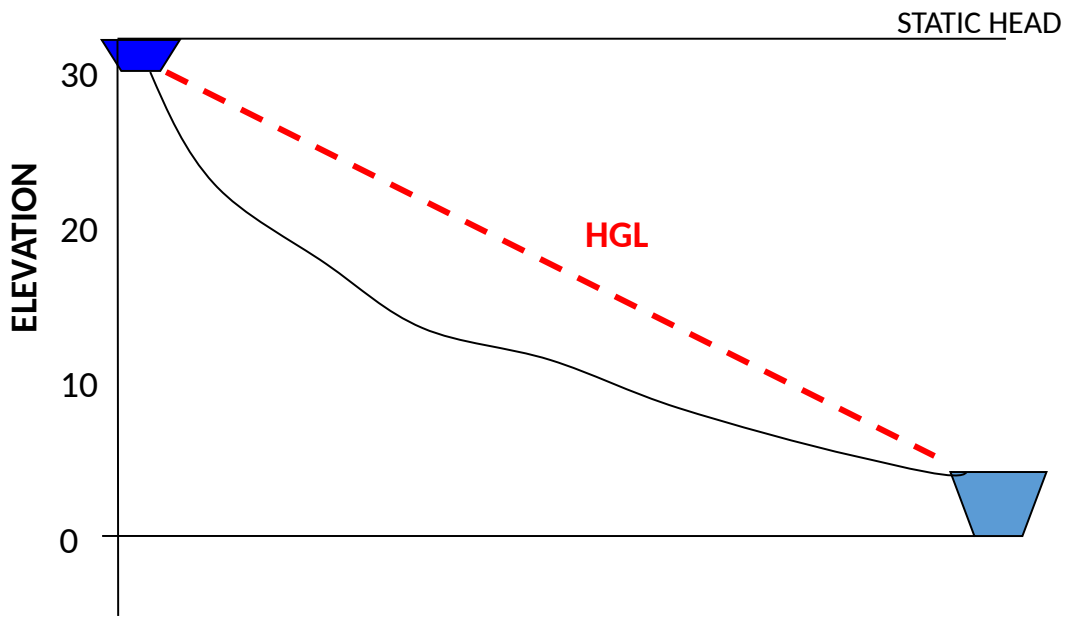
a. Causes contamination through leak by sucking water from outside.

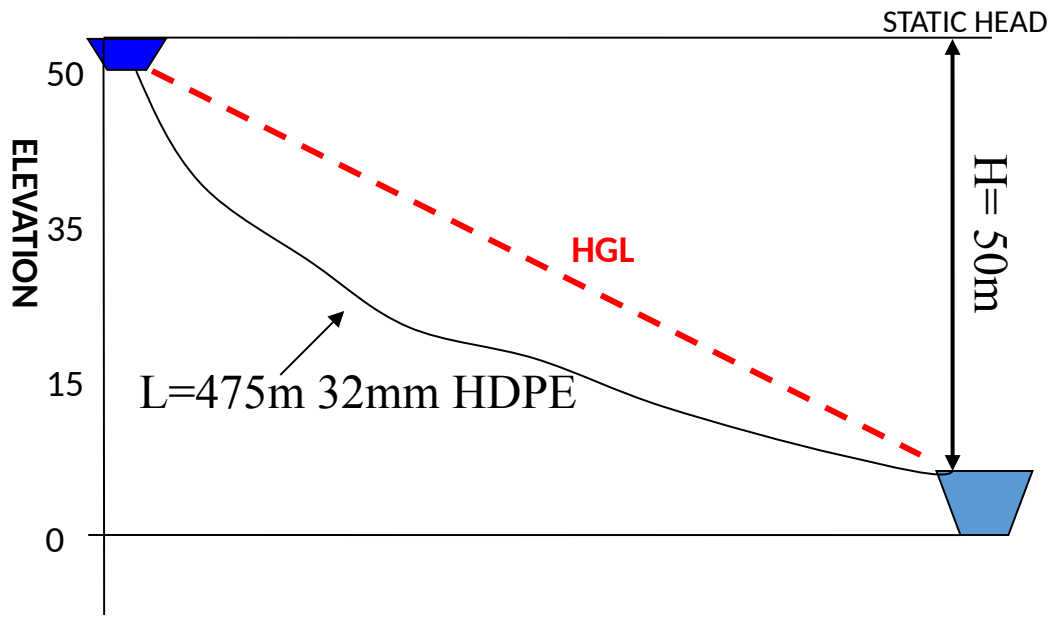
b. It reduces flow of water, when air is sucked in through leak.

c. Air block can occur at these places.

Natural Flow is the absolute maximum flow move by gravitational force, which occur when lower end is open to air. Residual head is equal to zero.

e.g. Pipe line from source to FCR





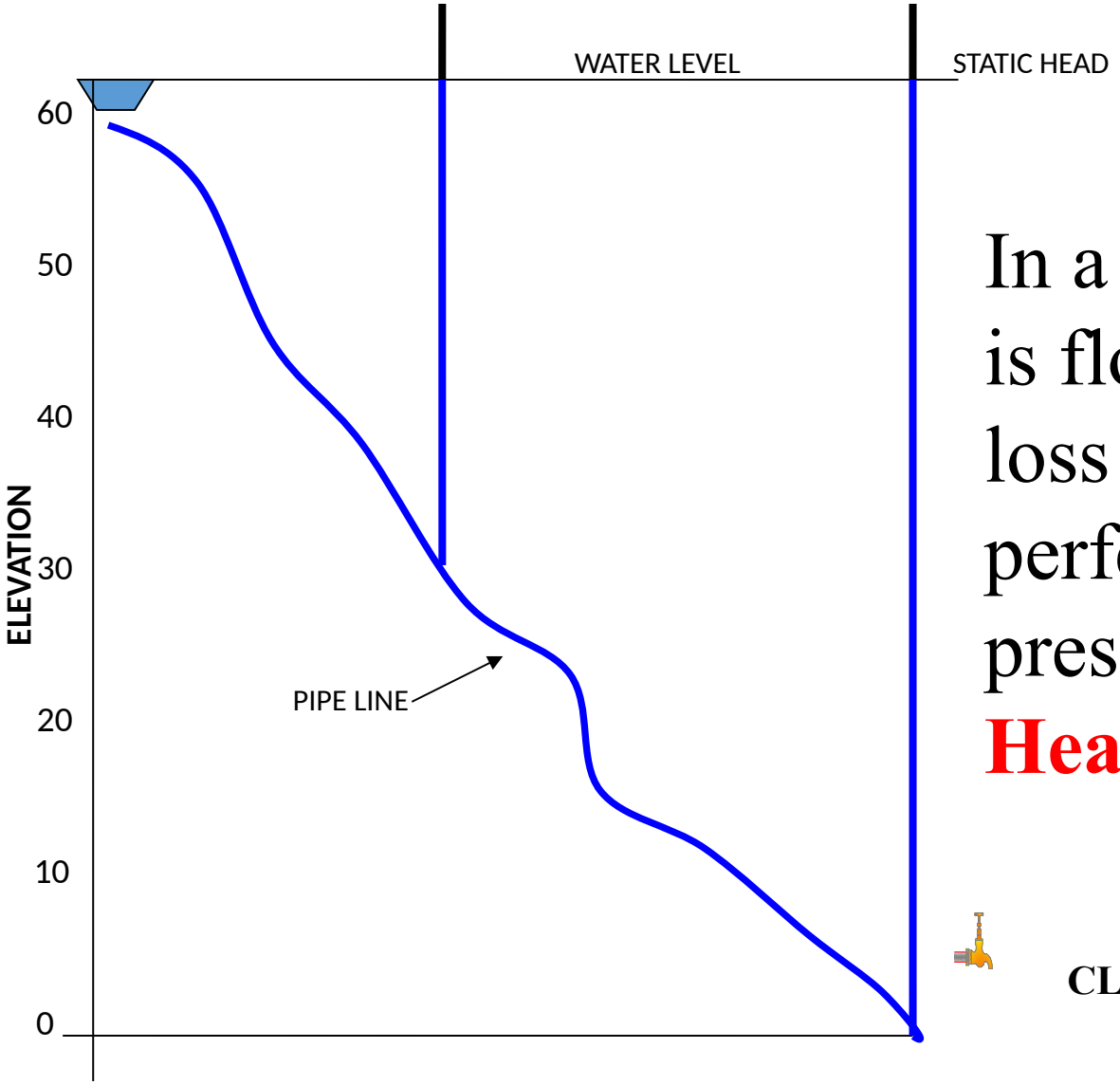
Example: What is the natural flow through the pipeline as shown above and the diameter of HDPE pipe used is 32mm?

Solution: Frictional Head Loss Factor

= Head difference / Ground distance = H/L = 50/475

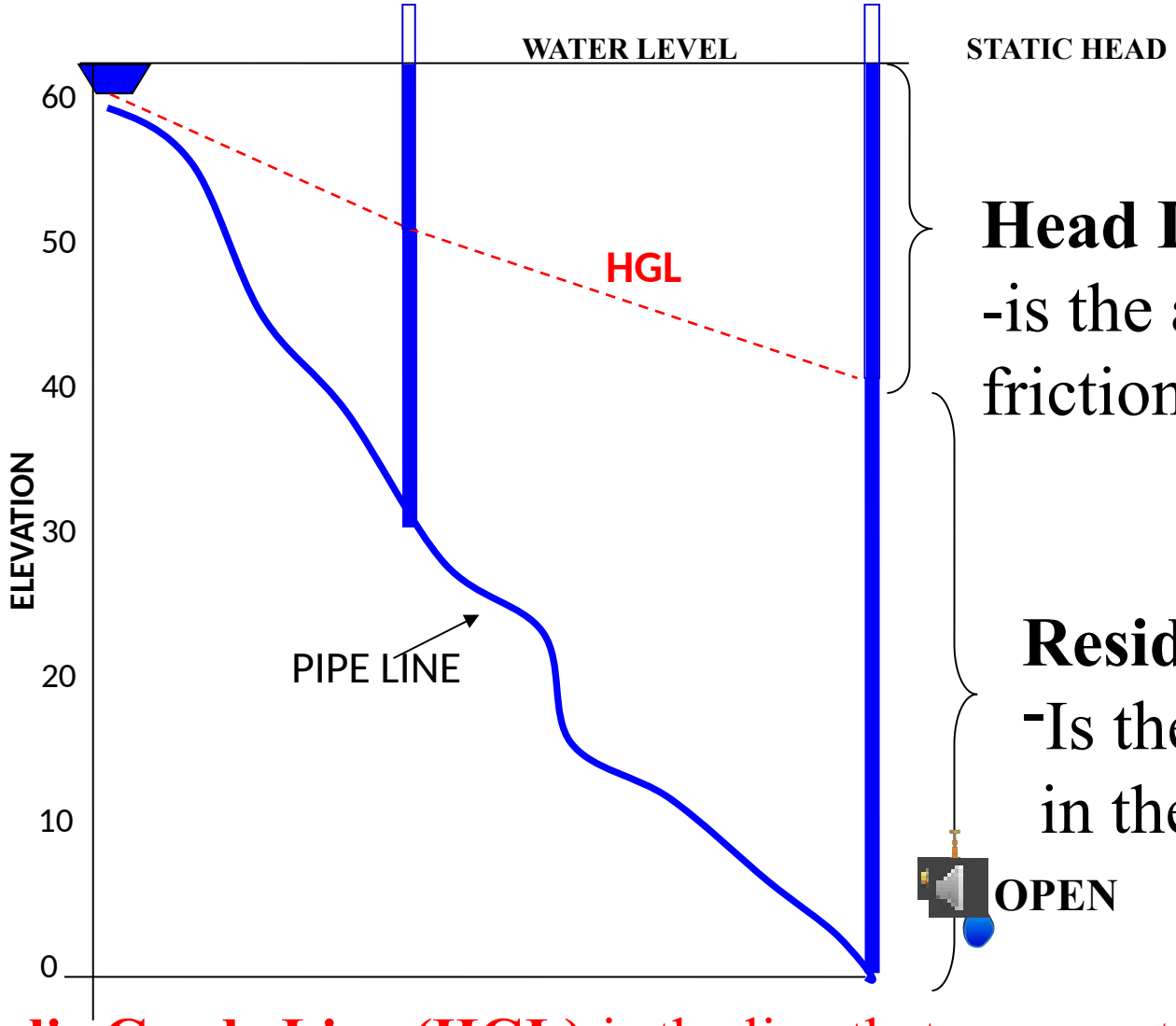
= 0.1053 = 10.53%

From the table Frictional Head Loss Factor 10.53% and pipe diameter of 32mm, **the flow is 0.90 lps**



In a pipeline where no water is flowing, there is no energy loss to friction and the level is perfectly horizontal, and this pressure is known as **Static Head**.

CLOSED



Head Loss

-is the amount of head lost by the friction of the flow

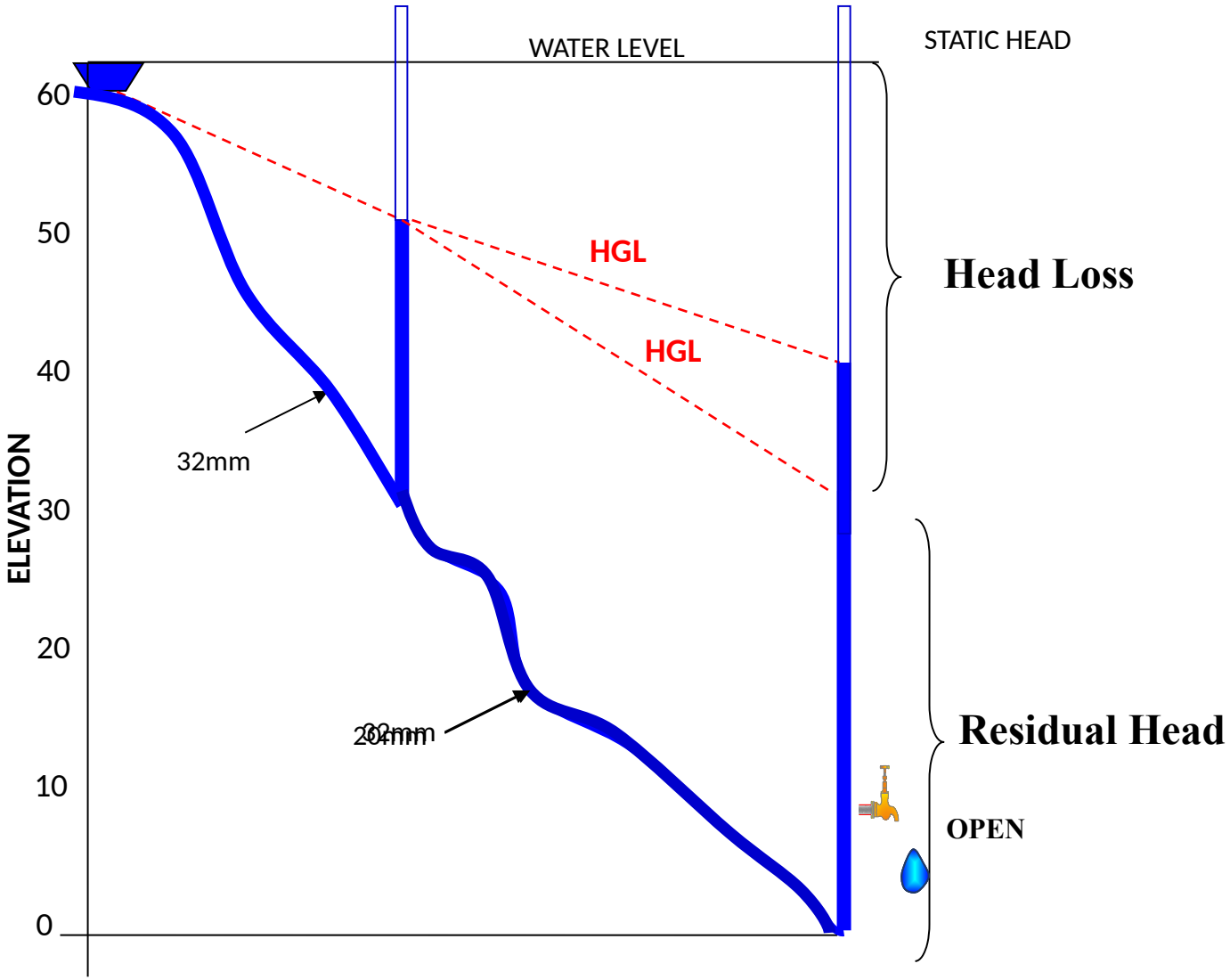
Residual Head

-Is the amount of energy remain in the system

OPEN

Hydraulic Grade Line (HGL) is the line that represents the residual head by the water levels in all tubes

-Since frictional losses are never recovered, HGL always slopes down along the direction of flow.



Residual Head is directly proportional to pipe diameter and inversely proportionally to velocity.

Flow remain constant.

DESIGN LIMITS

- **Flow velocity**

  maximum 3.0 m/s

  minimum 0.5 m/s

  Optimum = 0.8 to 1.4 m./s

- **Too high velocity** will cause excessive erosion of the inner wall of pipes or increase the risk of creating water hammer when valve is closed suddenly.
- **Too low velocity** can cause settlement of suspended particles collected at the low points in the pipeline.

- **Residual head**

  0 < RH < pipe PN value m

  Never negative RH

  -Such (-)ve RH can suck surrounding polluted water via leaky joints.

  -Large (-)ve RH can cause Air pocket at high points in the pipeline.

“Better the survey,
the more appropriate design will be,
and less reason to divert during
implementation.”

The context of compliance and Regulatory in Building Construction.

Presented By: Tenzin Phuntsho

Content

- **Building Rules and Regulation.**

1. Bhutan Building Regulation 2018 (**BBR 2018**)
2. Mongar Development Control Regulations 2016-2040(**MDCR 2016-2040**)
3. Gyalpoishing Development Control Regulations 2015(**GDCR 2015**)

Points covered in correlation to the above rules and regulations.

A. **Allowable Coverage, Usage and Setbacks**
B. **Building permit/Construction approval.**
C. **Offences and enforcements for failure to compliance.**

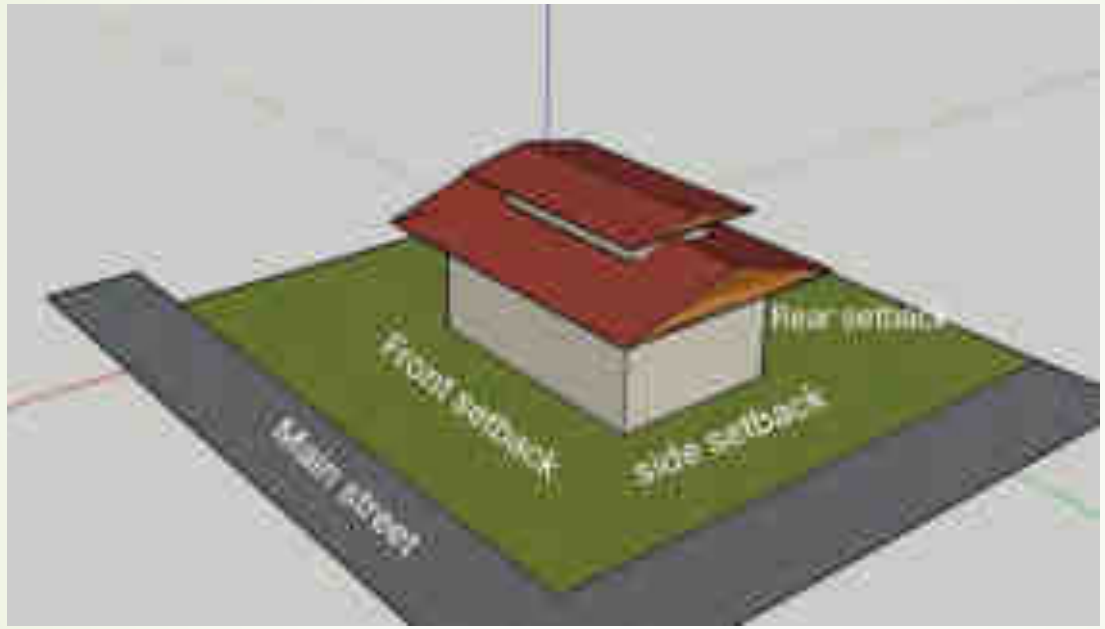
4. Jamthog and Basement Circulars.

Why the need for Building Regulations

- To establish standards for the construction of the buildings which are responsive to the needs of the people and consistent with the traditions of Bhutan.
- To ensure that buildings are safe and accessible.
- To establish procedures and requirements for the effective, transparent and efficient regulations of the constructions.

Setbacks

- It is a distance maintained between a building and the plot boundary on which the building is being constructed.



- Why?
- Uniformity and ventilation.
- Accommodate parking and septic tank
- Prevent overshadowing of adjacent plots

BBR 2018

- 2 or more habitable structures of 2 floors or less on the same plot shall have minimum of 4 m between them.
- 2 or more habitable structures of 3 floors on the same plot shall have minimum of 6 m between them.
- Setbacks area shall be open to the sky.(Balcony or staircase shall be disregarded)

Building Floors	Setback
2 floors	2 m on 3 sides and 5 m on 1 side accommodating septic tank
3 floors	3 m on 3 sides and 5 m on the side accommodating septic tank.

GDCR-2015

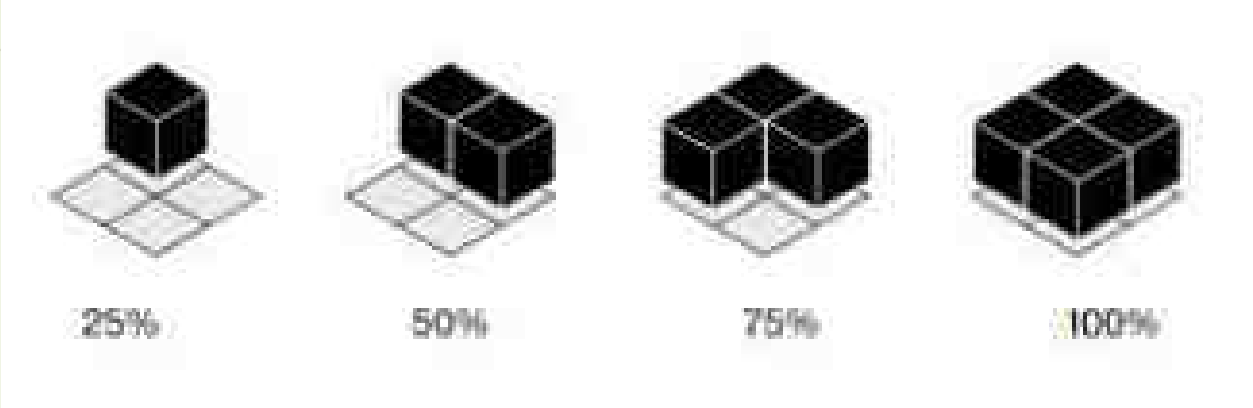
Precinct	Building Floors	Setback
Mixed Use	3	2m on side, 1.5 m in front and 3 m on rear accommodating septic tank.
Residential	3	3 m on 3 sides and 5 m on side accommodating the septic tank.
Institutional	3	3 m on 3 sides and 5 m on side accommodating the septic tank.
Heritage	2	3 m on all sides.

MDCR 2014-2060

- Setback areas are not be used for storage of materials of any kind.

Precinct	Building Floors	Setback
Urban Village-1	3	3m 3 sides and 2 m in the front or following the existing building line.
Urban Village -2	3	3m 3 sides and 2 m in the front or following the existing building line.
Urban Core-2	3	3m 3 sides and 2 m in the front or following the existing building line.
Urban Core-1	4	Governed by coverage.
Institutional	2	3 m on all sides
Service Precinct	2	3 m on all sides

Building Coverage



- Area of building(Building footprint/plinth) with respect to plot area.

- To control density.
- Limit building cover for provisions for permeable landscaped areas and private open space.

BBR 2018

- Max plot coverage 45% and Plinth area of 200 Sq.m
- Higher plot coverage may be approved for new construction:
  - In a clustered village where customary or existing construction rules apply
  - On the same building Plinth as an existing structure that is being removed and rebuilt upon.

GDCR-2015

Precinct	Coverage(%)	Usage
Mixed Use	Governed by setback	Commercial and Residential.
Residential	40	Fully residential
Institutional	40	Educational, Training, Government Institutions, Museums, Offices.
Heritage	40	Spiritual and religious artifacts and places, Chortens, Lhakhangs, Monasteries.

MDCR 2016-2040

Precinct	Coverage(%)	Usage
Urban Village-1	40	Residential with local level retail shops and services.
Urban Village-2	30	Fully residential. Any commercial use including retail outlets and shops shall not be permitted.
Urban Core-2	40	Both residential and Commercial uses
Urban Core-1	50	All commercial activities
Institutional	30	Educational, Training, Government Institutions, Museums, Offices.
Service Precinct	Governed by surrounding precinct.	Workshops and small inductries, water treatment plant, heavy maintenance undustries, ware house.

Building Permit

Intention to Build (Standard letter)

Documents Required
1. Land ownership certificate
2. Site Plan, Plot Layout
3. Architectural Drawing
4. Structural Drawings
5. Electrical Drawings
6. Plumbing(water and sanitation)

Municipality confirmation of continued conformity.

Required Revisions

Vetting by local government
1. Architectural Division
2. Structural Division
3. Electrical Division
4. Water Supply Division.

Service Connection

Approval by chairman

Occupancy Certificate

Occupy

Site Checks

Property Tax Assessment

Construction and demolition of buildings

- Notice to neighbors
- Safety during construction
- Power of inspection.
- Notification, Inspection and Directions
- Notification to utilities of demolition
- Direction to fix Building Work
- Stop-work order
- Demolition of unsafe or unauthorized structures
- Demolition squad for unauthorized structures.

Offences and Enforcement for failure to compliance.

Construction of Building without building permit/construction approvals.

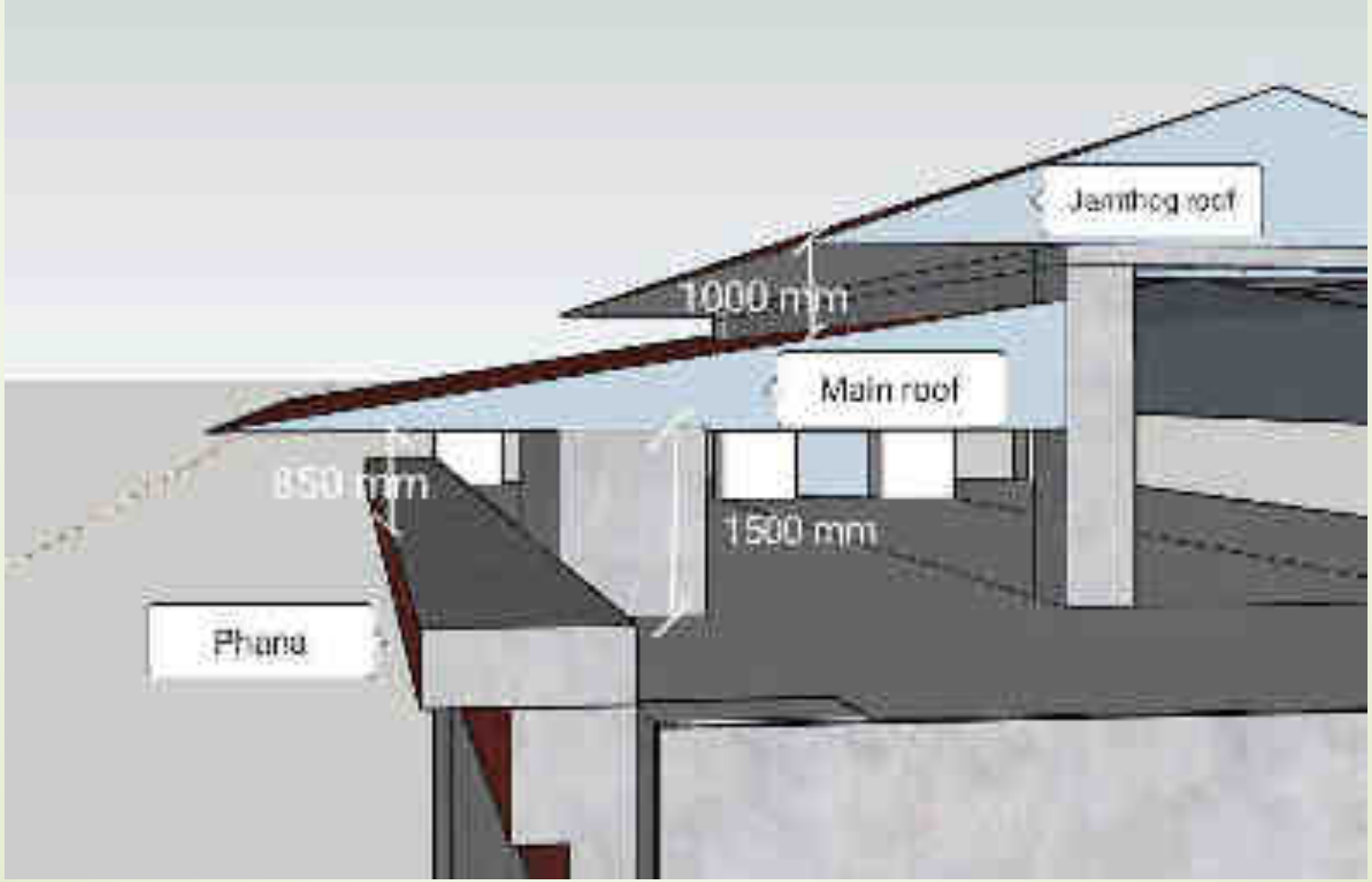
- a) Payment of **100%** of the cost of the deviated construction and **regularization** of the deviation, if **no application was made** but the construction is as per the Rules.
- b) Payment of **50%** of the cost of construction **and removal** of the deviation, if **no application was made** and the construction is not as per the Rules.
- c) Payment of **50%** of the cost of the deviated construction and **regularization** of the deviation, if **an application was made** and the construction is as per the Rules.
- d) Payment of **25%** of the cost of the deviated construction and **removal** of the deviation, if **an application was made** but the construction is not as per the Rules.

Offence	Infringement of Penalty
Use a basement for a purpose other than parking and services	**30 days** of minimum National Workforce Wage Rate (NWF) wage rate
Fail to give notice to neighbors of proposed building work	**14 days** of minimum (NWF)
Fail to notify local government of commencement of a stages of construction	**14 days** of minimum NWF at each stage of construction
Fail to notify utilities of a demolition	**14 day**s of minimum National Workforce Wage Rate
Obstruct or prevent an inspection	**30 day**s of minimum NWF wage rate
Fail to fix building work as required by a notice	**30 days** of minimum NWF wage rate
Fail to comply with maintenance.	Value of the cost of the maintenance.
Occupy a building without a occupancy certificate or in breach of a condition of an occupancy certificate	Three month's total rental income of the occupied area and 5% of total rental income each day, if the offence continues after the issue of the infringement notice.

- Infringement Notice
- Adjustment of infringement notice

Jamthog and Basement.

- Jamthog coverage is 45 % of the Plinth Area.
- Basement should be fully below the natural lowest Ground Level and it should be within building footprint.



TRASHIDELEK

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Royal Government of Bhutan

Dzongkhag Administration, Mongar

ཨའོ་སྒྲུབ་བཅའ་ཡིག་དང་གྲྭིག་གི།

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Procurement

Rules and Regulation 2023

Sonam Dorji
Asst. Procurement Officer

Presentation Outline

Definitions

1. Administrative Sanction

✓The work proposal by the **competent authority of the Government Agenc**y, for which a preliminary estimate along with drawings shall be submitted. It shall lapse if the work is not commenced within a period of **twelve months**.

2. Historical Documents

✓ Supporting documents SBDs as a part of eligibility criteria. Those documents aren't included for evaluation bids.

Cont.

3. Technical Sanction

Formal acceptance of technical soundness of a work to be executed either departmentally or as a deposit work or on contract.

4. Lowest evaluated bid:

Offers the best value for money, evaluated on the basis of various objective criteria set 15 out in the bidding document.

Not necessarily mean the “lowest quoted price”.

Domestic Preference

- Preference shall be given to the bid offering goods of Bhutanese origin, provided that the price difference does not exceed twenty percent (20%).

- In the case of works when tenders from foreign bidders are invited, a twenty percent (20%) margin of preference may be given to the national bidders

PRR 2023

Notification no. MOF/FS-04/23-23/DPP/3 dated June 29,2023, all the old documents including the PRR 2019 and SPRR 2021 will be **SUPERSEDED** by new Procurement Rules and Regulation 2023 with effect from 1st July, 2023.

New Documents

- SBD for procurement for large works (above 5 million)
- SBD for procurement for small works (below 5 million)
- SBD for procurement for large goods (above 0.5 million)
- SBD for procurement for small goods (below 5 million)
- Evaluation guidelines for procurment of works (above 5 million)
- IRB rules of procedure 2023
- SBD for subcontracting 2023
- Guidelines for preferred list of bidders 2023
- Guidelines of milestone contract 2023
- Guidelines for Framework Contract, 2023

Section 4.1 Procurement Thresholds

- The threshold levels for application of appropriate procurement methods are as follows:

Type	Open Tender/ Bidding	Limited Tender	Direct contracting
Works	Above Nu.15,000,000	Above Nu.10,000,000 and up to Nu.15,000,000	Up to Nu.10,000,000
Goods	Above Nu.1,000,000	Above Nu. 50,000 and up to Nu. 1,000,000	Up to Nu.50,000

Tender Committee	Threshold for Goods & Services	Threshold for Works
Gewog Tender Committee	Nu. 3 million	Nu. 10 million
Dzongkhag Tender Committee	Nu. 20 million	Nu. 100 million

Clause 5.1.3 Minimum Time limits for Submission of Bids

The following minimum time limits shall be observed.

Minimum Time Limits	**Open Bidding**		**Limited Tendering**		**Direct Contracting**
	International Competitive Bidding	**National Competitive Bidding**	**International Limited Bidding**	**National Limited Bidding**	
From the Day the documents are made available	30 days	21 days	6 days	5 days	By mutual agreement

Section 3.1.1.10: Levels of tender committee

1. Gewog Tender Committee

- The gewog tender committee shall comprise of:

1.The Gup as the chairperson;

2.The Gewog Administrative Officer;

3.The Gewog Accountant or the Dzongkhag Finance Section/ Services/Unit head as the case maybe;

4.Engineer representative from the Dzongkhag

5.The relevant field staff or the Dzongkhag's relevant sector head as the case may be.

- Tshogpa as decided by 4th DT Session

2. Dzongkhag Tender Committee

- The Dzongkhag Tender Committee shall comprise of:

1. The Dzongdag (Chairperson);
2. Dzongrab/ Head of Administration and Finance Section/ Service/ Unit;
3. Dzongkhag Sector Head concerned;
4. Head of Finance Section, Administration and Finance Section/ Services/Unit; and
5. In the case of works, the engineer or engineering consultant responsible for preparing the technical documents. In the case of goods & Services, the appropriate officer responsible for preparing the tender documents.

Clause 3.1.2.4:

- The respective Tender Committee shall be the **Competent Authority** and shall have the power vested in making any procurement decision beyond the functions prescribed in section 3.1.2.3 having exercised due diligence and best of their judgment but not contravening the existing provisions.

Clause 4.2.5: Direct Contracting Method

- In the absence of at least three bids following the application of Limited Tender methods, provided the terms of bidding documents have not changed;

Note: In case of previous PRR 2019, if Limited enquiry method failed in the award of contract then instead of opting for limited enquiry we should now use direct contracting method.

- This method shall only be applied under any of the following circumstances:

a) In case of emergency situation. An 'emergency' is a sudden unforeseen event which can result in injury, loss of life or critical damage to property or Infrastructure or economic loss or situation with extremely tight deadlines to complete the Projects and will lead to delay through the other procurement methods. However, situations that are created by an agency through a lack of planning or risk mitigation do not constitute an emergency;

Cont.

- The Procuring agency may opt for direct procurement of any large and complex procurement from the manufacturer or dealers with Original Equipment Manufacturer (OEM) dealership;
- Annual maintenance contract other than works;
- In case of works with contract amount up to ten (10) Million may be awarded upon fulfillment of the criteria prescribed; and/or
- The public official travelling to foreign country may opt to directly purchase goods from that country upon approval by Head of the Procuring agency if the rates are lower than the market price of Bhutan.

Note: Beware in terms of quality and procuring of goods that may be centrally procured

Cont.

- In the case of additional works provided that the value of the additional work does not exceed twenty percent (20%) of the original contract amount. Additional works exceeding twenty percent (20%) of the initial contract price and subject to availability of budget within the same program, special approval must be sought from the competent authority;

Clause 4.2.4.3:

- Having sought approval from Tender Committee, the procuring agency may rely on the **quotation rates** of another procuring agency including the rates of United Nations and other international agencies as may be applicable, subject to the condition that the unit prices are **same or lower than original contract and, provided that such prices are still the most advantageous to the procuring agency after price verification.** The procuring agency shall execute a **separate contract agreement** with the supplier.

Section 5.1: Essentials of Bidding process – Procurement Cycle

Clauses 5.1.1.6:

1. Framework Contract → October 2023 to September 2024

2. Regular Contract → Completed by end of December

Clauses 5.1.1.7

For procurement of works above 100 million, the procuring agency **shall mandatorily c**onduct Detailed Project Report (DPR). For projects with quoted amount below **100 million**, DPR may be conducted for complex procurement or if it is a pre-requisite while submitting for budget proposal.

Section 5.1.5: Clarification of Bidding Documents

- Pre-bid meeting shall be conducted for procurement of **works above fifty (50) Million**, **Goods above twenty (20) Million** and **consultancy services above five (5) Million.**

Section 5.1.9: Bid Security

- In place of a Bid Security, the Procuring Agency may instruct bidders to sign a Bid Securing Declaration form provided in the bidding documents accepting that they will be required to pay bid security amount specified in the Bidding Document **within five (5) days if**;

1. They withdraw or modify their Bids during the period of validity;
2. A bidder fails to accept the arithmetical corrections of its bid price; or
3. They are awarded the contract and they fail to sign the contract, or to submit a performance security before the deadline defined in the bidding document.

✓ Failure to pay as provided in section 5.1.9.1. will lead to **debarment of the bidder from being eligible to submit bids for contracts with all the government procuring agencies for the period determined by the Debarment Facilitation Committee.**

Section 5.1.11: Retention money/ Security deposit

- The procuring agency may prescribe a realistic defect liability period based on the type and complexity of the project which is defined in the bidding documents and contract agreement. However, the minimum Defects Liability period which shall be as follows:

1. Up to Nu. Five (5) million, twelve (12) months
2. Above Nu. Five (5) million, twenty-four (24) months or double the contract duration whichever is lower.

- In case of contracts of duration more than 12 months, fifty percent (50%) of the Retention Money **may be** returned to the contractor upon completion of work against the submission of an unconditional guarantee issued by a reputed financial institution and acceptable to the Procuring Agency.
- Such a guarantee shall be valid until the issue of a No Defects Liability Certificate.

Secure advance

- The provision for secured advances, if provided for, shall be incorporated in the bidding documents with the following conditions:

a) The amount of the secured advance **may be** hundred percent (100%) of the cost of materials delivered at the site of works which shall be supported by the original invoices/bills from the suppliers. All materials imported from other countries shall be supported by Bhutan Sales Tax Receipts or customs clearance; and

Section 5.2: Bidding Documents

- In the case of works, if the information required for preparation of estimate cannot be collected through section 1.1.5. and 1.1.6., the procuring agency **may use** the Bhutan Schedule of Rates (BSR) where applicable to establish an estimate for the cost of the works. Detailed estimates shall not be disclosed to the bidders. The bidders shall be expected to make their own estimates based on the specifications set out in the bidding documents, carryout site visits where necessary for calculation of estimates and submit the bids to the procuring agency.

Note: Shall use has been changed to may use. In PRR 2019, it was mentioned that the BSR shall be used where applicable to establish esitimate for the cost of works. However, in PRR 2023, they need to first do market analysis and identification of need to prepare the esitmate and if the estimate cannote be collected through it then BSR may be used.

Section 5.4.5: Abnormally Low Bid

- An Abnormally Low Bid is one where the Bid price, in combination with other constituent elements of the Bid, appears unreasonably low to the extent that the Bid price raises material concerns as to the capability of the Bidder to perform the Contract for the offered Bid price. Before proceeding to further analysis, the Procuring agency shall revisit their departmental estimate to ensure its realistic compared to the prevailing market rates.

- After revisiting the departmental estimate as provided in section 5.4.5.1, if the procuring agency determines that the bid offered by the **bidder is 20% below or above the agency estimate, the procuring agency shall eliminate the Bid(s) before proceeding towards bid evaluation.**

Section 5.4.9: Standstill Period

- The Procuring Agency shall observe 5 (five) days of standstill period from the date of the issuance of letter of intent to award to allow the bidders to lodge complain if aggrieved by the decision of the tender committee.

6.5 Monitoring of contracts

Project Engineer shall submit the monthly progress report to the Head of Procuring Agency.

The tender Committee or a Monitoring Committee shall MANDATORILY carry out compliance monitoring.

Section 6.3. Important Conditions of Contract

Clause 6.3.1. Price and Methods of Payment

- Subject to the provisions under 6.3.2, the rates and prices in a contract shall be on a fixed basis with the following exceptions:
- Increase or decrease in all duties, taxes, and levies payable by the contractor as a result of Government orders after the date, **twenty one (21) days** prior to the deadline for submission of bids; and
- All kinds of bills/invoices shall be paid **within twenty-five (25) days** after the submission of correct bills/invoice in complete form and such provisions shall be incorporated in the contract documents.

Section 6.3.7: Termination

- Early termination of contract for procurement of works shall be invoked if:

If the contractor fails to achieve all the three milestone agreements consecutively;

OR

In the event the contractor achieves at least one milestone agreement, but fails to achieve minimum of 50% in every item specified in the agreements at the end of three milestone period.

Cont.

- The method of payment upon termination shall be prescribed in the contract. The percentage to be applied to the value of work not completed at the time of termination shall usually be **twenty (20%) percent** subject to a maximum limit **often (10%) percent of the initial Contract Price.**

- Following the termination of contract, the procuring agency may:

1.Directly award or purchase from the market for procurement of

2.goods; or/and

3.Re-tender or execute departmentally for procurement of works.

6.4 Contract Management

The activities of contract management amongst others, may include;

1.Reviewing and approval

2.Signing of Milestone agreement

3.Monitoring periodically progress in implementation of the contract

4.Management of variation orders, contract suspension and termination, price revisions, contract remedies

6.6. Goods Receiving Committee

- The minimum of **three (3) members** led by the Procurement Officer or any other relevant officer shall be constituted to carry out the full inspection and conformity check during receipt of goods.

- The committee mentioned in section 6.6.1. shall be accountable for any certification of faulty acceptance of the goods.

Thank you!

Do you have any questions?

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Dzongkhag Administration, Mongar

Royal Government of Bhutan

PRESENTATION ON WORKS PROCEDURES AND ACCOUNTING

PRESENTER:

Tshewang Jamtsho

Presentation Outline

1. Works Category
2. Execution of Works- Pre-requisites
3. Mode of Execution
4. Terms of Payment on award of Contract
5. Execution of works-Record Keeping
   - A. Measurement Book
   - B. Site Order Book
   - C. Hindrance Register
6. Payment and accounting of advances
7. Payments to Contractor and accounting thereof
8. Reports on completion of works
9. Closed Work

Works Category

Works

Original

1. All new Construction
2. Additions, alteration, renovation, remodeling that increase the value of existing property
3. Initial repairs to newly acquired properties
4. Restoration of previously abandoned and bringing them into use
5. Repairs and maintenance during their construction
6. Capital Expenditure

Maintenance

1. Routine repairs and maintenance
2. Remodeling, improvements, replacement or re-construction and doesn't result into increase in the value of existing property
3. Current Expenditure

- ✓ **Initiate only against approved budget appropriation**
- ✓ **PRR, AA& TS**

Execution of Works- Pre-requisites

Approvals and Sanctions

1. Administrative Approval and Financial Sanction (AA&FS)

- ✓ Former approval accorded by the appropriate competent authority to start the works or services based on budget appropriations
- ✓ Based on detailed estimates along with architectural and engineering drawings where applicable

2. Technical Sanction

- ✓ Formal acceptance of technical soundness of work to be executed
- ✓ Departmentally, Deposit work & Contract
- ✓ Based on drawings, designs and specifications including detailed estimates
- ✓ Issued by the competent technical authority
- ✓ TS amount shall be within the amount specified in AA& FS

Validity of AA&FS

- 12 months from the date of issue unless specified

Mode of Execution

1. **Tender**

- ✓ Open and fair competitive bidding based on Procurement Rules and Regulation
- ✓ Categorization and classification of construction firms by the Construction Development Board (CDB) or such other authorities

2. **Departmentally**
3. **Deposit Work-** Work assigned by one Agency to another Agency
4. **Community Contracting**

Terms of payment on award of contract

- ❖ *Works estimated to cost up to Nu. 0.100m, the contract shall specify that no amounts shall be payable to the contractor till the whole work has been completed and issued completion certificate.*
- ❖ *Works costing more than Nu.0.100m, the contact shall specify the payment intervals as agreed between the parties coinciding with the physical progress of the work*
- ❖ *Practice ?*

Execution of Works- Record Keeping

Measurement Book

- Record the detailed actual measurement of quantities of work carefully and accurately. **[FAM- 6.3]**
- Maintained by site Engineer

✓ **Role of supervising Engineer**

- *Conduct 100% check measurement- Subsequently measured such as Foundation .*
- *Conduct 40% of the total value for other works.*
- *Record the results of Test Checks in MB under his/her Signature*
- *Sign below the Abstract of measurement*

✓ **Responsible for head of Engineering cell/ Disbursing Unit**

- Test Check a minimum of 20% of the total value of the works

Site Order Book

- ✓ *Maintain by the concerned site engineers for all works* ***[FAM-6.5]***
- ✓ *Record instructions passed at site pertaining to work*
- ✓ *Notice to the Supervising Engineer for the written authorization if there is any changes required*
- ✓ *Must ensure that there is enough financial commitments*
- ✓ *Signatures of the officials giving the instructions, Contractors representative must record and close it .*
- ✓ *Review regularly to ensure for the compliance*
- ✓ ***Invariably referred at the time of Preparation and submission of :***

1. *Deviation statement*
2. *Substitution items*
3. *Extra items*
4. *Additional items*
5. ***Time extension***
6. *Final Payment*

FAM – 6.5

SITE ORDER BOOK

Name of work:
Date of commencement:
Name of contractor/Site Incharge:

Sl. No	Date	Remarks of inspecting officer	Signature of inspecting officer	Signature of contractor/Site Engineer	Action taken		Remarks
					Details	Dated Signature	

INSTRUCTIONS FOR SITE ORDER BOOK (FAM – 6.5)

1.	Serial No	:	Serial number of the entries in the site order book
2.	Date	:	Date of entry
3.	Remarks of the Inspecting Officer	:	Instructions/orders of the inspecting officer and contractor's difficulties/problems shall be recorded
4.	Signature	:	Self-explanatory
5.	Action taken – Details	:	Action taken to rectify the mistakes/difficulties/errors
6.	Dated Signature	:	Of the official responsible for taking action
7.	Remarks	:	Any other information/details

Hindrance Register

- ✓ *Maintain by the concerned site engineers for all works* ***[FAM-6.6]***
- ✓ *Record any hindrance affects the progress of the work*
- ✓ *When such hindrance has affected*
- ✓ *Signature of Site engineer, Supervising Engineer and the contractor's representative shall be recorded clearly and close it*
- ✓ ***Refer for the time extension request***

Royal Government of Bhutan

Finance & Accounting Manual

FAM-6.6

HINDRANCE REGISTER

Name of work: ..... Date of Commencement: ..... Name of Officer: .....

Name of contractor: ..... Due date of Completion: .....

Sl. No.	Nature of Hindrance	Date of Occurrence	Date on which hindrance is over	Free lapsing hindrance period (Days)	Net Hindrance (Days)	Signature of Site Supervising Engineer	Signature of Contractor	Intimation to Head of Office		Remarks
								Ref. No.	Date	

Instruction for Hindrance Register (FAM – 6.6)

1.	Serial No.	:	Serial Number of the hindrance
2.	Nature of hindrance	:	Brief particulars of hindrance
3.	Date of occurrence	:	Date on which the hindrance occurred
4.	Date on which hindrance over	:	Date on which the hindrance was rectified
5.	Over lapping period	:	Over lapping period for two or more hindrances shall be specified
6	Net hindrance	:	Net period lost due to the hindrances
7.	Signatures	:	Self-explanatory
8.	Reference to Head of Office	:	Self-explanatory
9.	Remarks	:	Any other particulars/information

Payment and accounting of advances

Types of Advances

1. **Mobilization Advance**

- An interest free amount paid to contractor upon submission of unconditional Bank Guarantee issued by reputed financial institution and acceptable to procuring agency
- Based on contract terms and agreement
- Maximum: 10% of the initial contract price unless specified

2. **Secured Advance**

- Advance paid to the contractor against the construction materials brought at the site
- Supported by bills and invoices
- Maximum: 75% of the value of required items brought at the site

Payments to Contractor and accounting thereof

- ✓ Based on the quantities recorded in MB
- ✓ Subject to the terms of agreement in the form of **Running Bill-** *Successive claims against the work for the payment against the progress of the work*
- ✓ Joint measurement sheet
- ✓ Check on theoretical consumptions of important items such as cement, steel, road etc.. By Supervising Engineer as per technical norms

Checks from Accounts Unit

a. *Measurements have been test checked to the extent required*

b. *Arithmetically correctness as per the quoted rates and quantities (BOQ)*

c. *1st RA bill, Check whether the Performance Guarantee is provided or not*

d. *Check the validity of BG and ensure that Guarantee remains valid till the recoveries are complete (Mobilization Advance)*

e. *Should compare with the previous RA bills for the subsequent RA bills*

f. *The Mobilization Advance must be recovered fully not later than when 80% of the work is completed and must be recovered on installment basis starting from the first RA.*

g. *Recoveries of secured advances must be affected from the running account bill as and when the materials were used in the same work as evident from MAS account.*

Reports on completion of works

- *Site Engineer should submit the works completion report* ***(FAM 6.10)*** *to head of office through Supervising Engineer indicating the final expenditure and the date of handing over of the work*
- *Copies of completion reports of original works shall be sent to DPP and the property officer shall record the total cost of the asset in Fixed Asset Register* ***(GIMS)***
- ***Property Officer-*** *An officers delegated with an authority and responsibility for safe custody and utilization of Government properties*

FAM – 6.10

(Overleaf)

Works Completion Report

Name of Office:
Name of Work and Activity Code:
A.A. & FS No., Date & amount:
Total amount of TS/Detailed Estimates:
Actual Expenditure:
Amount of Variation and percentage:
Date of Commencement:
Brief reasons (for variation):

Date of completion:

(Reverse side and continuation check)

Royal Government of Bhutan — Finance & Accounting Manual

FAM – 6.10 Contd

Technical Sanction No. & Date:

Sl. No.	Name of item	As per Estimate				As Implemented		Variation		Remarks
		Quantity	Unit	Rate	Amount (Nu)	Quantity	Amount (Nu)	Quantity	Amount (Nu)	
	Total Nu				A	–				
	Actual Expenditure Nu.						B			
	Difference Nu.						–	–	(A–B)	

- As per estimated rate :
-

Reference to the last entry in Sub-ledger:
Reference to the last entry in MB (Book & Page No.):

Signature, Name & Date (Site Engineer) | Signature, Name & Date (Supervising Engineer) | Signature, Name & Date (Head of Finance Section) | Signature, Name & Date (Head of Office)

Closed Work

Liabilities to the contractor/supplier kept unsettled due to dispute or other reason beyond the control of budgetary bodies where work is completed and all formalities such as handing taking is completed.

When?

The budgetary bodies shall adjust the closed work accounts within **one** month after the closure of the FY.

Exception

- **Legal dispute**

THANKING YOU ALL

Presentation On e-Zotin System.

Present By:-

Amber Bdr Pradhan,AE-IV

Presentation outline

- Highlight on Ezotin,CRPS,Etool,CiNET and it’s uses.
- Tool access to Tender upload.
- Setting criteria for human resources and equipment's.
- Bid Evaluation for Small, Medium and Large works.

Introduction of eZotin

e-Zotin is a composure of online services rendered by Bhutan Construction and Transport Authority (BCTA). It has the following applications incorporated with it:-

- 1. Contractor Registration & Performance System (CRPS).
- 2. Construction Industry Information System (CiNET)
- 3. Online Evaluation Tool (e-Tool).
- 4. Simplified Procurement Rule and Regulation (SPRR) .

System Adoption

1. Construction Industry Information System (CiNET) – 2009.

2. Online Evaluation Tool (e-Tool) – 2011.

3. Contractor Registration & Performance System (CRPS) – 1st June 2016.
4. Simplified Procurement Rule and Regulation (SPRR) – 2022.

OBJECTIVES / PURPOSE:

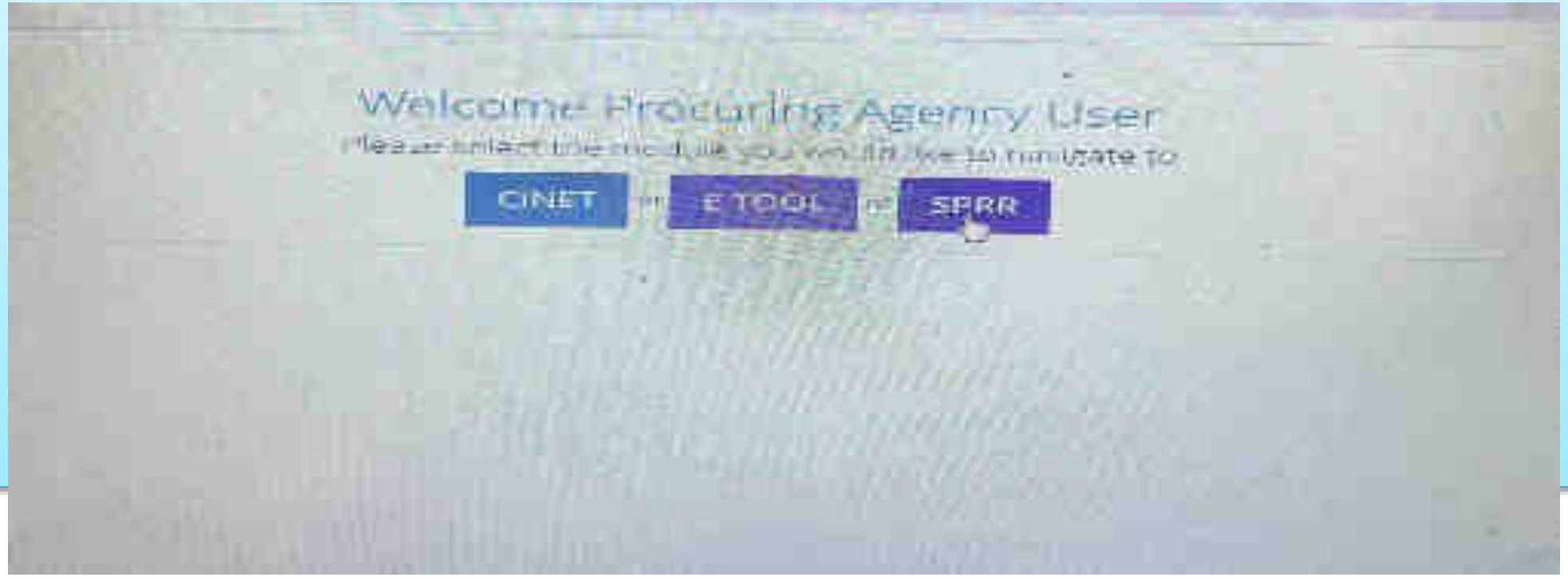
- To ensure fair and transparent registration.
- To ensure fair evaluation.
- To adopt efficiency and transparency in the decision making.
- To share correct information.
- To maintain proper Audit trials of the system and users.

CiNET

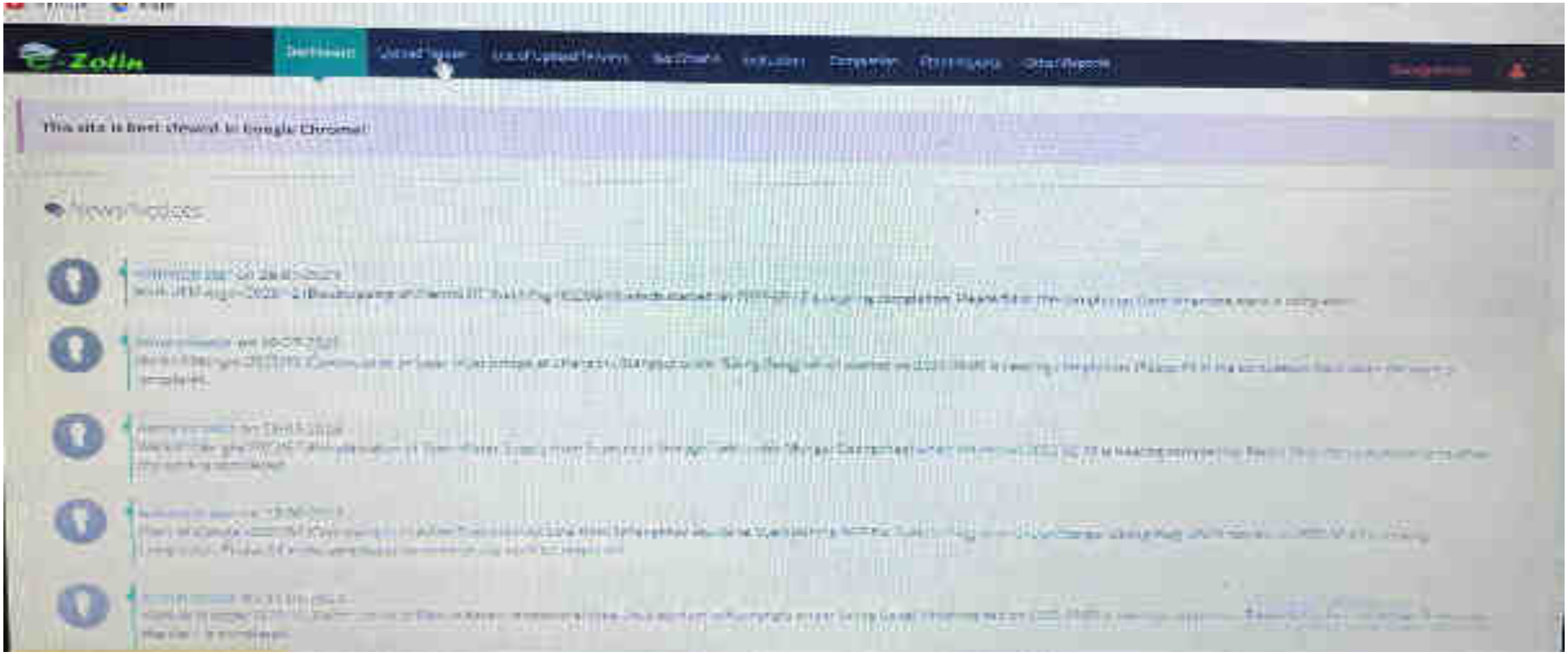
CiNET (Construction Industry Information System) – Use by Non Government Originations (NGOs) donor funded projects to update the work information.

Tool System Access to Tender upload.

- To upload the tender
- First Login to e-Zotin
- Select SPRR (Simplified Procurement Rule and Regulation)



Tool System Access to Tender upload



e-GP Tender Id

e-GP Tender ID

Search Clear

Reference No./Letter No. *

Reference No.

Name of Work *

Description of Work *

Normal text **Bold** *Italic* Underline

Contact Person

Contact No.

Contact Email

Dzongkhag *

Classification *

---SELECT ONE---

Category *

---SELECT ONE---

Method *

---SELECT ONE---

Method *

---SELECT ONE---

Contract Period (Months) *

Contract period in months

Tentative Start Date *

Tentative End Date *

Project Estimate Cost *

Project Estimate Cost

Show Project Estimate Cost in Website *

Yes No

Date of Sale of Tender Document *

Closing Date of Sale of Tender *

Last Date & Time of Submission *

Opening Date & Time *

Cost of Tender Document *

Cost of Tender Document

EMD/Bid Security *

EMD

Publish in Website *

Yes No

Upload Tender Related Documents

Document Name	Upload File
	Choose Files no files selected

Save Cancel

Criteria setting for Access to Skilled manpower

Tier of importance	Position	Qualification/Experience	Score
Tier – I	Project Manager	BE civil engineer with 10+ years of experience	40
		BE civil engineer with 5-10 years of experience	30
		BE civil engineer with less than 5 years of experience	20
		Fresh graduate engineer with BE civil	10
		Any other level of qualification or experience	0
Tier – II	Project Engineer	BE civil engineer with more than 5 years of experience	30
		Diploma engineer with more than 5 years of experience	20
		Diploma engineer less than 5 years of experience	10
		Any other level of qualification or experience	0
Tier – III	Site Supervisor	Diploma engineer with 3+ years of experience	20
		Personnel with formal training certification from TTI and at least 5 years of experience	15
		Fresh TTI graduate	10
		Any other level of qualification or experience	0
Tier- IV	Fresh Graduate Engineer	Fresh graduate engineer trained and certified in CMS, OHS, e-GP & BCTA refresher courses.	10
		Any other level of qualification or experience	0

Criteria setting for Access to Equipment's

Tier of importance	Equipment	Number Required	Score
Tier – I	Excavator (>= PC 200)	1.00	50.00
Tier – II	Tipper Truck	1.00	30.00
Tier – III	Concrete Mixer	1.00	10.00
Tier – III	Concrete vibrator	1.00	10.00

Documents required for skilled manpower

Documents required:

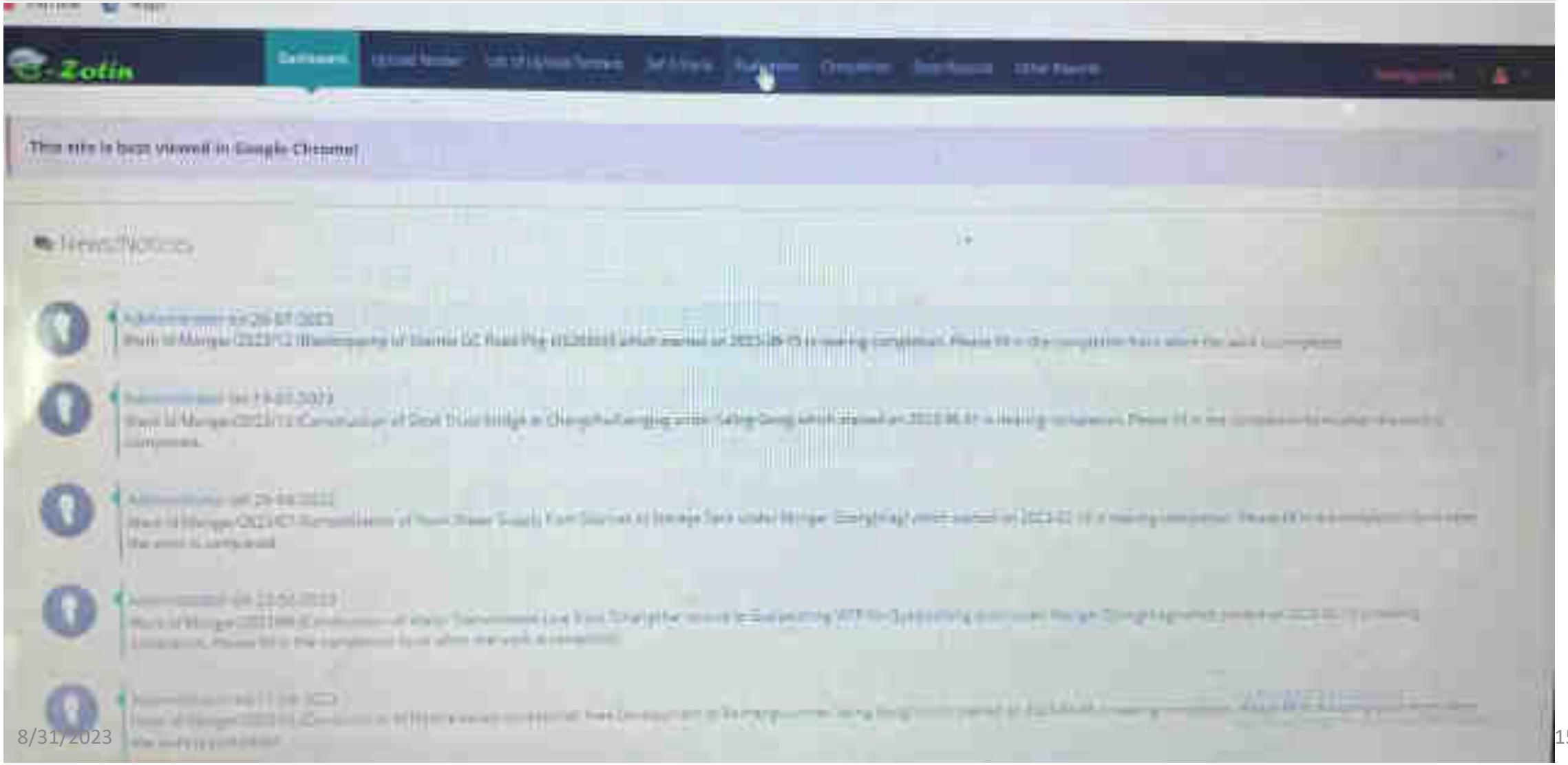
- CV
- CID, Election ID card (for foreign workers)
- Contrat agreement - Contract agreement should be work based/specific.
- PF – For Permanent HR
- **Certificate of HR.**

Documents required for Equipment

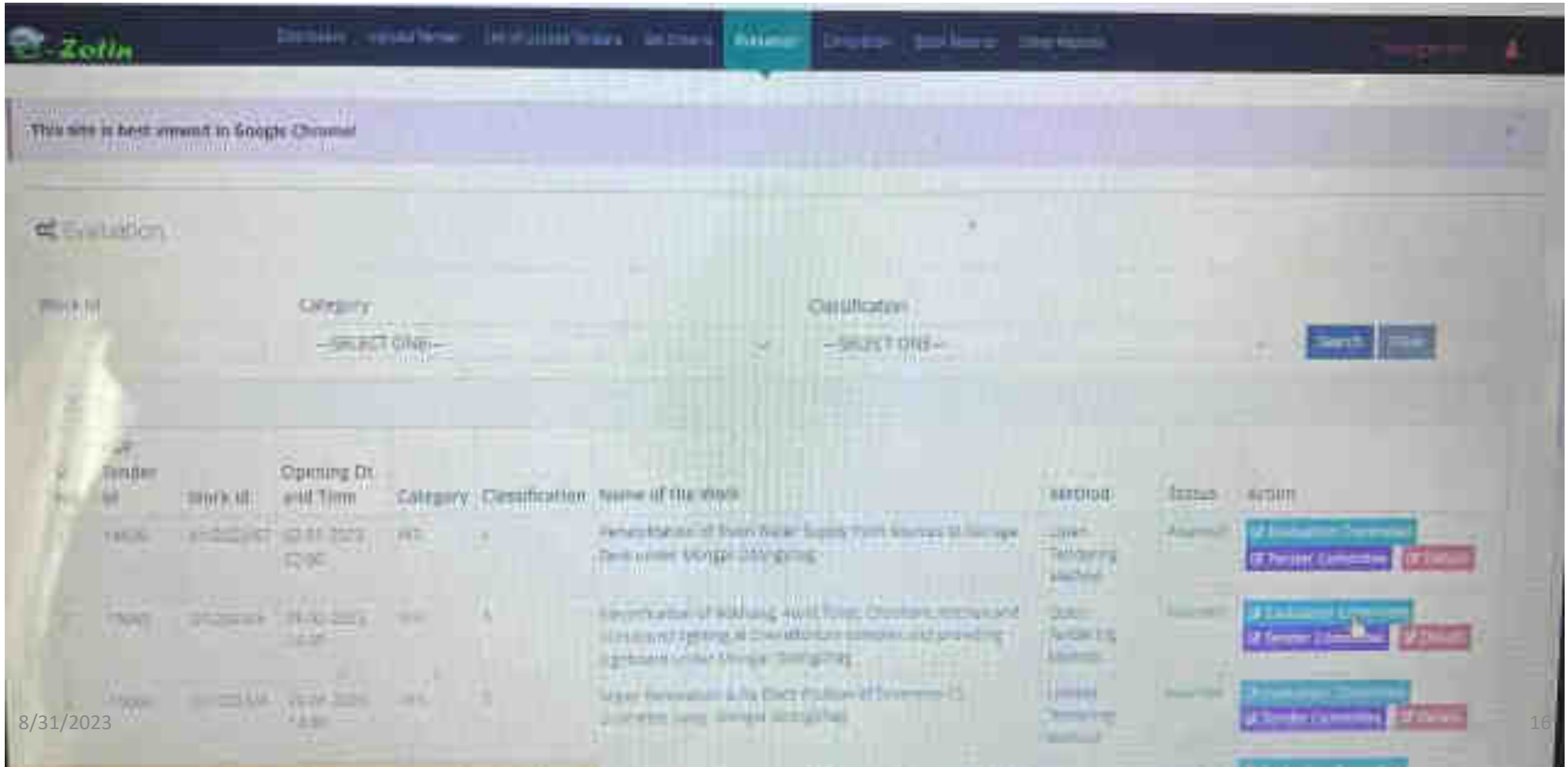
Documents required:

- Copy of the registration certificate of each equipment committed.
- Copy of Insurance policy for each equipment where applicable
- In case of hiring, copy of the lease agreement (specific to the project)
- In case of equipment's that do not require registration with BCTA copy of cash memos stamped by RRCO if newly imported or copy of sale deeds.

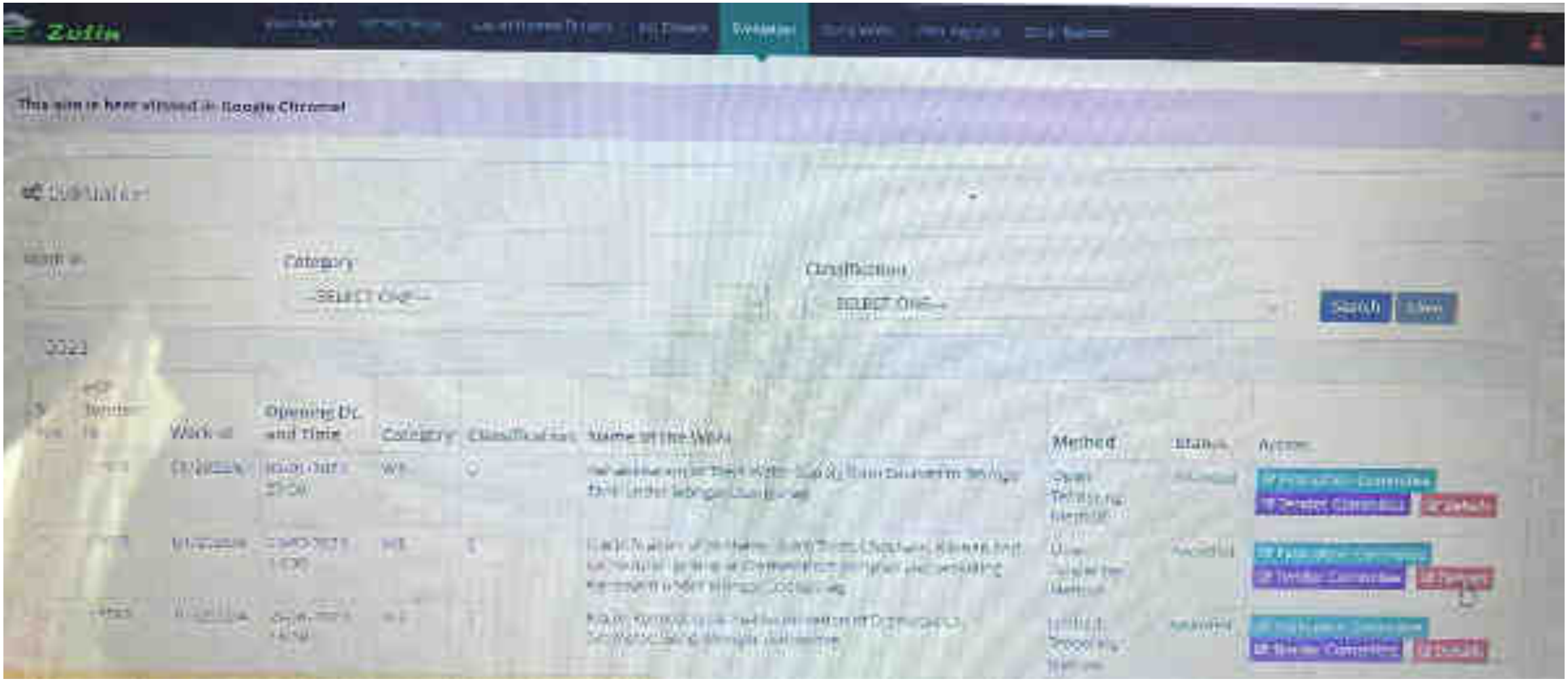
Bid Evaluation Small works



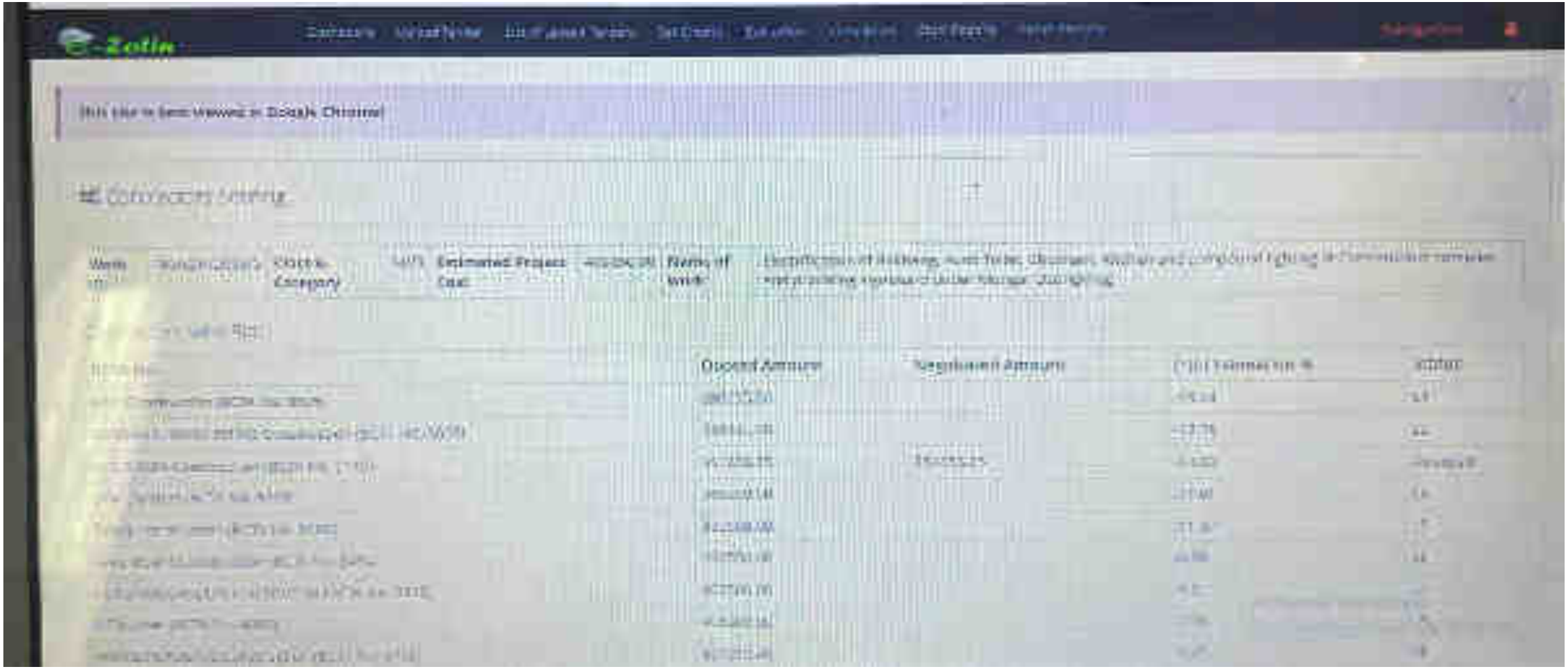
Bid Evaluation for Small works



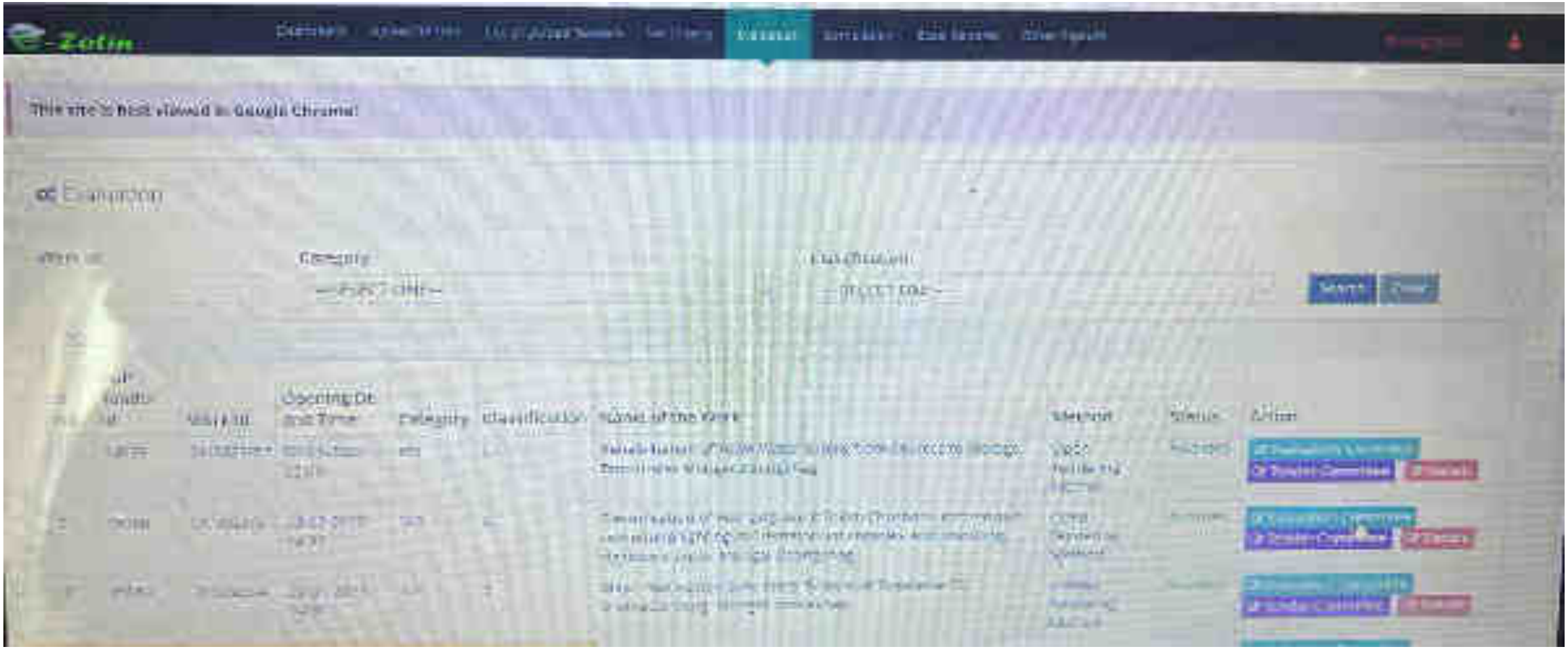
Bid Evaluation small works



Bid Evaluation small works



Evaluation for Medium & Large works.



Medium & Large works.

- Fill up Credit line submitted by firm.
- Fill up HR and Equipment submitted by firm.

Score Detail for Human Resources

Sl. No.	CID No.	Name	Tier	Position	Qualification/Experience	Score
1.	11811003450	Tashi Dorji	I	Project Manager	BE civil engineer with 10+ years of experience	8.00
2.			II	Project Engineer		
3.			III	Site supervisor		
4.			IV	Fresh graduate Engineer		

Score Detail for Equipment's

Sl.No.	Registration No.	Tier	Equipment	Score
1	BP-5-A0015	I	Excavator (>= PC 200)	10
2		II	Tripper Truck	
3		III	Concrete mixture	
4		III	Concrete vibrator	

REPORT

Stage 1 (Technical)									Stage 2 (Financial)					
CAPABILITY					CAPACITY		Technical Score	Technical Score				Financial Score		
Similar Work	Equipment Score	HR Score	APS	Works (any category) completed	Bid Capacity	Credit Line	100%	30%	Quoted Amount	Negotiated Amount	(*II) Estimation %	70%	Grand Total	Status
10.00	16.00	20.00	10.00	10.00	10.00	0.00	76.00	22.80	24,520,083.09		16.55	70.00	92.80	H1 (Awarded)
10.00	15.00	14.00	3.48	10.00	25.00	5.00	87.48	26.24	18,603,486.00		36.08	60.01	86.25	H2
10.00	5.00	4.00	5.75	5.00	23.00	8.00	59.75	17.93	18,642,499.60		-1.8	0.00	0.00	Not Qualified

Award of Work

Award

(Lowest quoted bid among qualifying bids)

A= *70 * ----------+ 30% of Technical score of A*

Financial bid quoted by A

A – Contractor for whom score is to be calculated

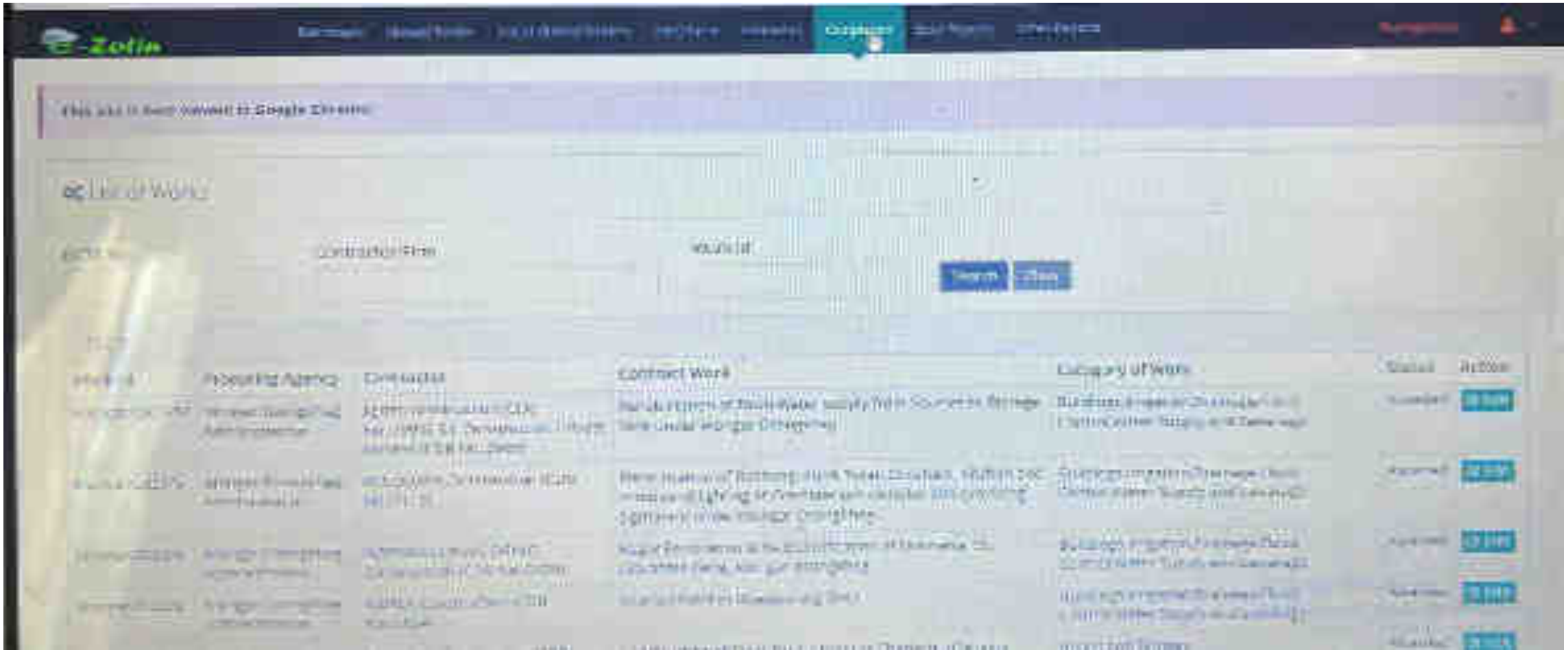
The work will be awarded having highest A score.

Award of Work

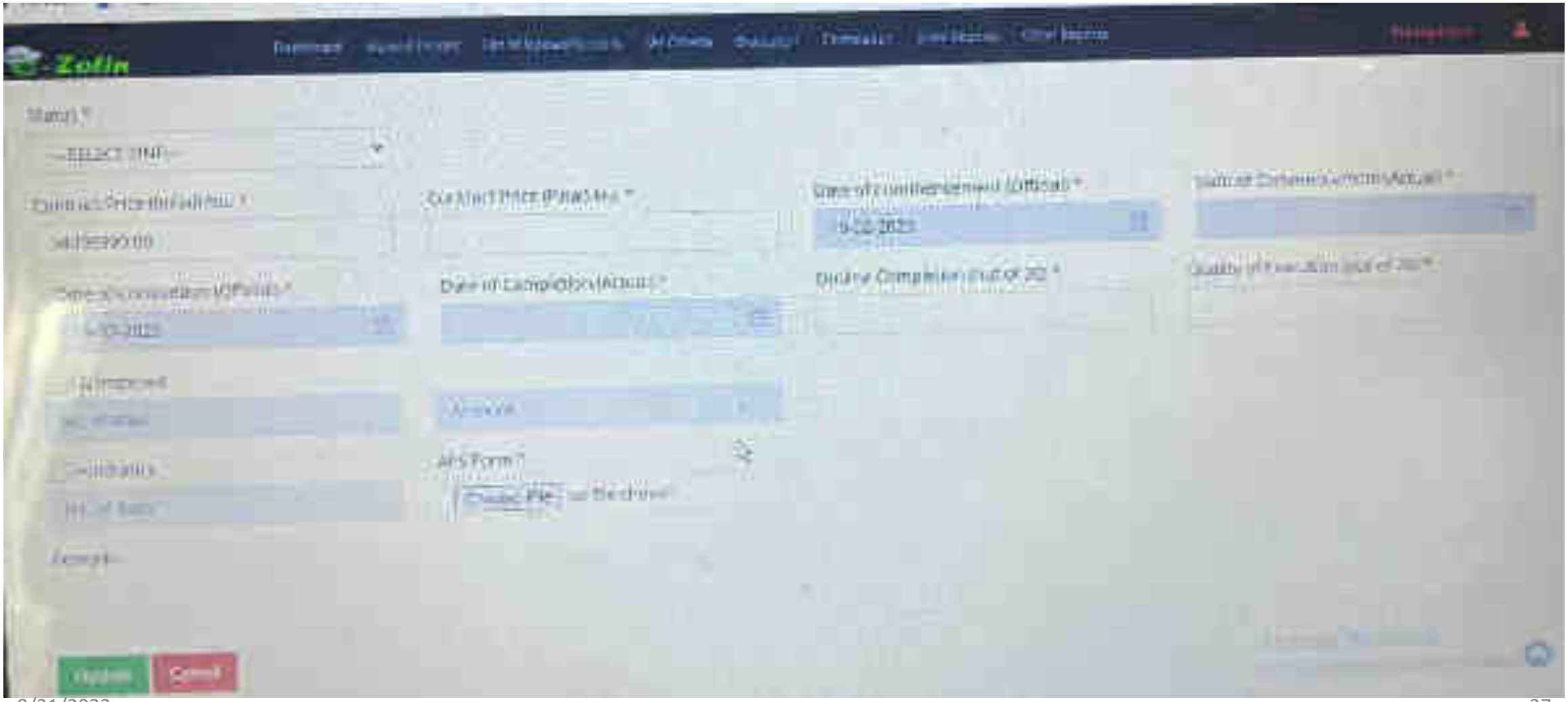
- A = 70 * 24,520,083.89/24,520,083.89 + 22.80
  = 70 * 1 + 22.80 = 92.80

- B = 70 * 24,520,083.89/28,603,486 + 26.24
  B = 70 * 0.86 + 26.24
  B = 86.44

Average Performance Score (APS)



Average Performance Score (APS)



Issues

- Not updating of works in SPRR system soon after issuing of work order.
- Not uploading of average performance score (APS) in the system after the work completion.

Thank You

RURAL WATER SUPPLY.

CONTENTS

- Survey.
- Estimation.
- Designing (done by RWSS focal Engineer Lobzang Tshering)
- Material requisition as per the estimation.
- Forwarding of Material list to Gewog for placing of supply Order.
- Execution of work.
- Completion/Hand taking
- Adhoc work

SURVEY

- a. Introduction Meeting
- b. Village mapping I
- C. Source Investigation.
- d. Scheme Layout.
- e. Village Mapping II
- f. Genjas and Commitment

CHALLENGES

- As per the survey guideline, we are suppose to do survey on dry season (January to April) but with the financial year closing on June , we are bound to do survey on August and September months, where its gives an inaccurate yield.
- People gives false information of source, creating problem during implantation after all materials are procured .
- Poor participation by beneficiaries during survey and other related meeting , resulting in false information.
- Survey equipment (Abney level/altimeter and also Laptop for estimating).
- Budgets are booked under estimate , resulting insufficient for the required project .
- There are no proper guidelines for proposing the budget in RWSS.

CHALLENGES

- Maximum project has no trained care taker and also RWSS committee member.
- RWSS work execution only aged and unskilled are turn up for work.
- Due to insufficient budget , we cannot find skilled labor (No Muster Roll).
- Poor ownership towards the project after completion.
- Numerous water schemes are constructed, where it can be clubbed as one scheme.(Eg. Thridangbi)
- Procurement of materials should route through Procurement Officer or Store In-charge.
- Adhoc work sometimes hamper in work plan.

WAYFORWARD

- Gewog has to plan one or two year ahead to determine the proposed source as perennial and also estimate (Planning).
- Gewog has to frame by-laws to attend all the beneficiaries in meeting.
- Survey equipment must be procured in dzongkhag.
- In past, once project is completed it has to last at least for 7 years, but these days within 1 to 2 years gewog proposed rehabilitation, which is not realistic.
- Gewog has to proposed budget of care taker training/VMC .
- Gewog has to frame the RWSS Maintenance Committee member and Constant Monitor required .

WAYS OF RURAL WATER CONSTRUCTION PROCESS IN PICTURE .

SOURCE CONSTRUCTION AT KORMEY YANGBARI CHIWOG.

PREPARATION OF FERRO CEMENT RESEVOIR CONSTRUCTION (FCR) OUT LET, INLET, OVER FLOW AND WASHOUT.

SOURCE CONSTRUCTION AT BANGBALA VILLAGE, GONGDUE GEOG.

FERROW CEMENT RESEVOIR CONSTRUCTION AT THRIDANGBI

FIELD VERIFICATION BY THE AUDIT TEAM AT THRIDANGBI

WASHOUT AND AIRVALVE INBETWEEN SOURCE TANK AND RESEVOIR TANK

BREAK PRESSURE TANK CONSTRUCTION

FCR MAINTENANCES AT KORMEY ,YANGBARI CHIWOG,GONGDUE GEOG.

PREPARATION OF FORM WORK OF TAPSTAND POST AND PIPE JOINING.

COMPLETION OF PROJECT

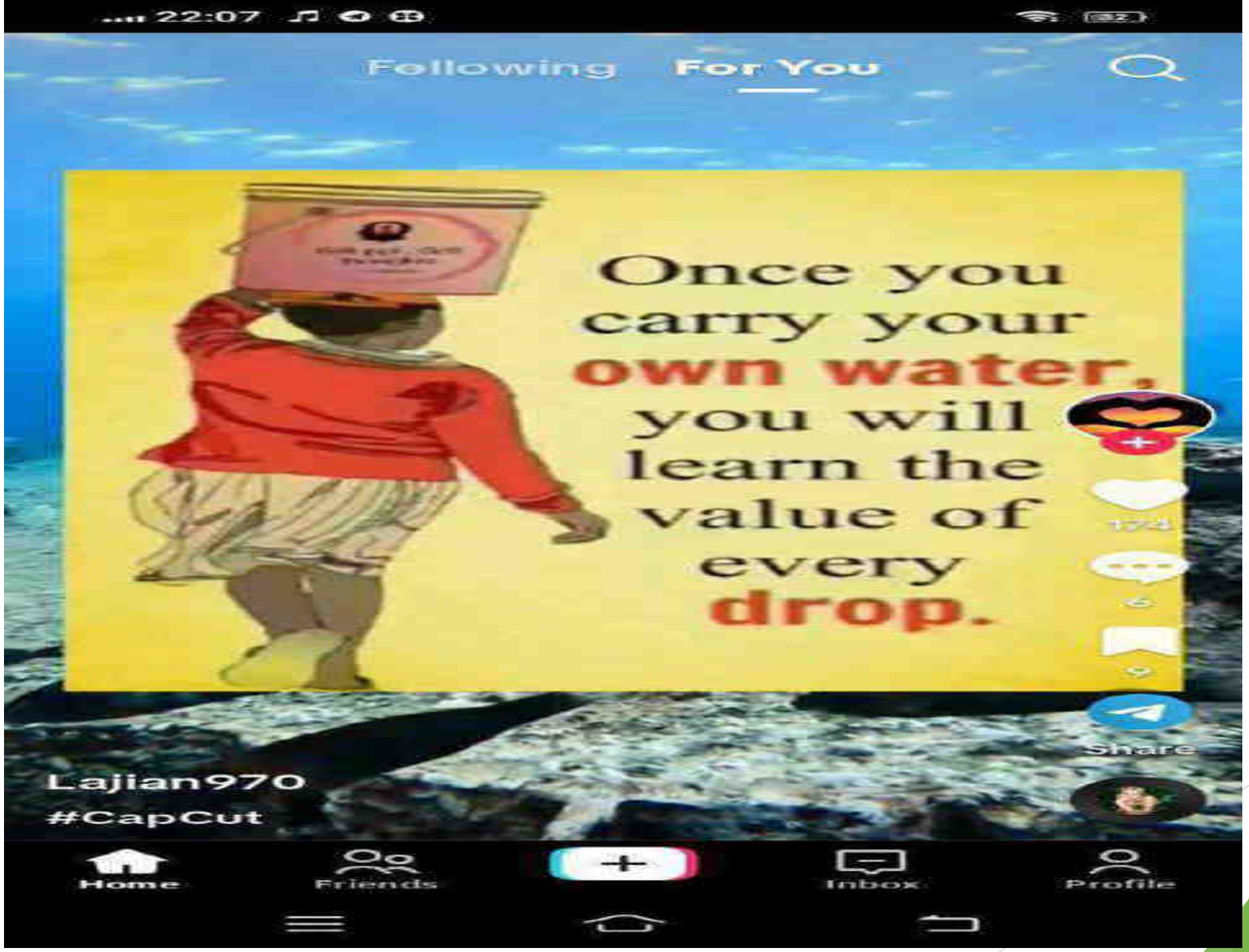
ALL BENEFICIRIES ARE GATHERED FOR HANDING OVER OF THE PROJECT

KENGMA HOUSE IS THE SPECIAL CURRY IN THE JUNGLE.

CONCLUSION

- The Royal Government of Bhutan is spending a lot of money on Rural Water Supply every year.
- Despite government spending so much money, time and effort for better water supply and better sanitation we still see scarcity of water not only in town but also in rural areas.
- It is surprising to see such problems as Bhutan has abundance of water every where.
- From the above problems, we can clearly say its all the failure of coordination management.
- Our country needs better development and coordinated management of the existing water source and the existing schemes or project.

IF NOT


22:07
Following
For You
Once you carry your own water, you will learn the value of every drop.
174
Share
Lajian970
#CapCut
Home
Friends
Inbox
Profile

THANK YOU

Presentation on town water supply

Contents

1. Water sources and its issues
2. Discharge measurement
3. Transmission lines(main pipe lines).
4. Number of water meters in Mongar Town.
5. Reservoir tanks and its capacity.
6. Challenges and issues

1. Water source and its issues.

- Chompa 1.
- Chompa 2
- Chompa 3
- Rejuk source
- Yakpogang 1
- Yakpogang 2
- Yagang 1
- Yagang 2.

2. Discharge measurement (Lean season and Rainy season)

Sl. No.	ame of source	Discharge in lean season (Lps)	Discharge in Rainy season (Lps)
1	Chompa 1	0.57	1.32
2	Chompa 2	0.39	0.87
3	Chompa 3	0.63	7.18
4	Rejuk	2.21	14.15
5	Yakpogang 1	1.93	13.51
6	Yakpogang 2	3.81	12.50
7	Yagang 1	0.20	3.20
8	Yagang 2	0.30	2.30
	Total	10.04	55.03

2. Discharge measurements

3.Transmission lines(main pipe lines) and its issues.

- 1.Chompa line = 13.50 km
- 2. Napa line =7.00 Km
- 3. Kadam old line =7.00 Km

4. Number of water meters and issues in Monger Town .

- Town area – 143 Nos(Tobgay)
- Trailing – 80 Nos (Tshering Dorji)
- Changshingpeg – 43 Nos(Choki Dorji)
- Dzong Area- 82 Nos (Sherab Dorji)
- Sakarwang – 66 Nos (Sherab Dorji and choki)
- Kadam area – 66 Nos (Sherab Dorji)

Total meters =480 Nos

5. Reservoir tanks and its capacity.

- 1. Kadam – old 0.12 MLD
- 2. Kadam new tank – 1.40 MLD
- 3. High school tank – 0.15 MLD
- 4. Trailing Tank – 0.15 MLD
- 5. Changshingpeg tank – 30,000/- liters
- Sakarwang tank – 30,000/- liters

6. Challenges and issues

1. Man power during break down of pipe lines.

- Timely opening and closing of town water
- Fire Hydrant works.

Work in progress near Threma Lhakhang

Completed work below Kadam

Thank you

Presentation on Urban Water Supply- Issues and challenges on Operation & Maintenance.

Presentation outline

1. Water sources and its issues
2. Discharge measurement
3. Transmission lines(main pipe lines).
4. Number of water meters in Mongar Town.
5. Reservoir tanks and its capacity.
6. Challenges and issues

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- Sakarwang tank – 30,000/- liters

Total 1.88 MLD

6. Challenges and issues

1. Man power during break down of pipe lines.

- Timely opening and closing of town water
- Fire Hydrant works.

Work in progress near Threma Lhakhang

Completed work below Kadam

Thank you